Stock Market Reaction to the Global Financial Crisis: testing for the Lehman Brothers' Event1

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Keywords: Global Financial Crisis, Event Study, Corporate Governance, Product Quality, Ratings.
JEL codes: G14, G24, G01.

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Abstract

We analyse with an event study approach the stock market reaction to Lehman Brothers' filing for chapter 11. Our inquiry on abnormal returns of about 2,700 stocks around the event date documents that RiskMetrics-KLD corporate governance and product quality indexes capture factors affecting investors' reaction to the shock. We also find that investors rationally attribute more value to the information on each rating domain than to affiliation/non-affiliation to the FTSE KLD 400 Social Index. Investors seem to discover, after the event, that KLD ratings provide original information which is not captured by traditional financial rating indicators.

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1. Introduction

"The market's focus will now shift from estimates of write-downs, capital needs and merger and acquisition scenarios, to concerns about counterparty exposures and default risks"

Research note, Panmure Gordon & Co analyst Sandy Chen (15 September 2008).

The global financial crisis of 2008-2009 was one of the most dramatic and path-breaking events in financial history. Since the crisis is still very close in time, the vast amount of analyses and reflections in the press are not paralleled for the moment by a similar number of rigorous theoretical and empirical analyses.

Our paper aims to fill this gap by evaluating with an event study the stock market's reaction to one of the most important episodes in the crisis: the announcement on 15 September 2008 by Lehman Brothers that it would file for chapter 11.

More specifically, we are interested in verifying how stock markets reacted to this specific event. Since Lehman received negative net rating scores for corporate governance and product quality from social rating agencies, we investigate whether abnormal returns of other companies were affected by social ratings in these two domains at the event date. In this respect, another specific line of inquiry is whether social ratings mattered only when indirectly signaled by affiliation to a CSR index or whether investors were able to react to such information also for non CSR index affiliated firms. In other words, we are interested in verifying whether investors were able to exploit the superior informational content of analytic net scores on the specific CSR domains contained in the RiskMetrics database or in other similar information sets.[1,2]

Our measure of social rating consists in one of the best-known benchmarks of social responsibility: the selection criteria used for the FTSE KLD 400 Social Index compiled by RiskMetrics-KLD.[3]

Being part of the index is undoubtedly a signal of CSR quality. However, since the index has a fixed number of constituents, exits may only be determined by a CSR downgrading or a lack of representativeness due to a sharp fall in the stock market value (*lack of social and financial representation* according to the standard RiskMetrics-KLD definition). As a consequence, it is not uncommon to find many stocks of high CSR quality on the waiting list.

For this reason we are interested in evaluating whether investors rationally react, beyond index affiliation, to the impact of the specific RiskMetrics-KLD

[1] As well known, the literature defines as signals those information sets which can be manipulated by the agents to which they are attributed. In this sense CSR ratings are a particular type of signal since their characteristics depend on both the action of the rated company and the evaluation of such action by a third party (the rating agency).

[2] RiskMetrics Group acquired in 2009 the Kinder, Lydenberg, and Domini Research & Analytics, Inc. (hereby RiskMetrics-KLD). Kinder, Lydenberg, and Domini Research & Analytics, Inc. was an investment research firm providing management tools to professionals integrating environmental, social and governance factors (ESG) into their investment decisions.

[3] For further details see Appendix A.

scores in each of the seven CSR domains. As we will document later, our main results outline a "flight to CSR quality" effect where the rating weaknesses of Lehman Brothers (corporate governance and product quality) are the most important factors affecting abnormal returns on other stocks at the event date. We argue that the 15th September shock led investors to a different interpretation of these signals in regard to their effects on the market value of the stock.

The paper focuses on three main strands of literature. First, it contributes to studies on the relationship between corporate governance quality and equity prices. In their influential paper, Gompers et al. (2003) <29> investigate the long run effects of the Corporate Governance Quality (CGQ) index on stock returns and balance sheet indicators in the 1990s.[4] The authors observe that their analysis cannot completely solve the problem of endogeneity by disentangling direct and reverse causality effects and controlling for correlation of dependent and independent variables with a third omitted driver. This is especially the case of some of the balance sheet indicators considered by Gompers et al. (2003) <29>, which may exhibit persistence under the form of positive autocorrelation across time. Our event study looks at the problem from a different angle and on a different historical moment, thereby enriching knowledge in this specific field. Even though our study observes a phenomenon and the reaction to it in a much more limited time span, it identifies a temporal and logical sequence from the event (announcement of the Lehman Brothers' bankruptcy) to its effect (ex post abnormal returns of observed securities which cannot be considered as causes of the exogenous shock generated by the announcement thereby ruling out the possibility of reverse causation). It is likewise difficult to assume that a third omitted variable (unrelated to factors captured by our indicators such as transparency, accountability and product quality) caused both the event and the prompt reaction to it by the stock prices under analysis. Furthermore, if analysis of long run stock returns is the right choice when trying to evaluate whether a given factor affects corporate financial performance over a long period of time, the long run consequences of the present global financial crisis cannot yet be investigated, while event studies are well suited to analyzing the short term financial market reaction to one of its crucial events. [5]

A second strand of the literature to which our paper intends to contribute concerns the relationship between product quality and stock market perfor-

[4] The authors build an index based on 24 attributes and evaluate on a sample of around $1,500$ stocks the impact of the latter on several balance sheet indicators and alphas of portfolios of stocks aggregated on ascending/descending values of that index. One of their main findings is that an investment strategy which buys shares in the portfolio of stocks with highest shareholder rights, and sells those in the portfolio of stocks with lowest shareholder rights would earn around 8.5 % per year in terms of abnormal returns in the 1990s.

[5] Another important difference when comparing our approach to Gompers et al. (2003) <29> is that (as shown in Appendix A) the RiskMetrics-KLD concept of corporate governance quality is somewhat different from that of the CGQ index. Although far from complete, it is interesting for its stronger emphasis on the issue of manager compensation policies, a question on which public opinion became much more sensitive after the crisis.

mance. The empirical literature in this field has mainly focused on the effects of product recalls (understood as negative signals of product quality) on stock market performance and, more specifically, on drug and automobile recalls, finding most of the time negative abnormal returns around the event date <42>. In general, in these papers the stock market reaction has been shown to exceed the actual ex post costs due to recalls and the excess loss is interpreted by the authors as a loss of "goodwill" (reputation).[6] Our contribution to this research field is in looking at the effect of product quality on stock performance based on events occurred to a stock (different from those we observe) which may have generated negative externalities on firms with similar product quality KLD performance.

Finally, we contribute to the literature on corporate social responsibility and stock performance. Corporate social responsibility may be viewed as an enhanced concern in corporate strategies for the environment and for stakeholders other then shareholders (mainly consumers, workers, suppliers and local communities).[7,8] As can be clearly observed in the Riskmetrics-KLD criteria which will be used in our empirical analysis, enhanced stakeholders' satisfaction implies in most cases higher costs for firms which decide to pursue CSR oriented policies (i.e., on waste management and polluting emissions, on workers' satisfaction, and on philanthropic activities in favor of local or more distant communities).[9] These extra costs can be off-set by five potential benefits. First, CSR may be seen as an optimal strategy to minimize transaction costs with stakeholders (Freeman, 1984 <24>). In a country like the US, where class actions facilitate legal action against corporations, this is an important issue. Second, it may gain the favor of "concerned" consumers who are willing to pay for the CSR intangible values (i.e. environmental friendliness) incorporated in the products and services sold by the firm.[10] Third, workers' productivity may be higher for at least two reasons: i) the effect of enhanced wage and non wage benefits according to the traditional efficiency wage theories and ii) the enhanced stimulus of intrinsic motivations due to the reduced gap between workers' ideals and

[6] Another type of event which has widely been analysed and interpreted as a signal of product quality consists in airline crashes (see, among others, Chalk, 1987 <15>; Borenstein and Zimmerman, 1988 <9> and Bosch, Eckard and Singal, 1988 <10>).

[7] Concern for the environment may be also seen as concern for the consequences of its degradation on local communities and future generations.

[8] Among seminal contributions in the debate on pros and cons of the CSR approach see Friedman (1962) <26> and Freeman (1984) <24>. The discussion on the methodological problems which may arise when pursuing the goal of maximizing multiple stakeholders interests can be found in Jensen (1986) <31> and Tirole (2001) <45>.

[9] The only straightforward cost decreasing element in RiskMetrics-KLD criteria is probably the limit on managerial compensations.

[10] For empirical tests on the willingness to pay for intangible social and environmental values of products revealed in consumer purchases see Becchetti and Rosati (2007) <8>. An interesting theorization of this phenomenon in oligopolies in which some companies "retail public goods" is in Ghatak and Besley (2007) <28>.

corporate goals.[11,12] A recent empirical test on this third potential benefit of CSR policies has been performed by Edmans (2009) <19>, who finds that those who are regarded as top US companies in terms of workers' satisfaction earned an annual four-factors alpha of 4% from 1984-2005.

Fourth, CSR may foster innovation (i.e. in developing more efficient energy saving processes), thereby creating a technological leadership and a competitive advantage. Last but not least, it may be a signal of product quality in a framework of asymmetric information, given that one of the main stakeholder groups to which CSR refers is that of consumers (product quality is indeed one of the eight RiskMetrics-KLD domains). In this respect, it may act as a reputation insurance mechanism by which consumers are less inclined to blame the company in the presence of adverse product quality shocks. Minor (2009) <37> tests his proposition by looking at the effect of product recalls on abnormal returns and considering 184 events. He finds that firms with better RiskMetrics-KLD ratings earn a 3 percent abnormal return with respect to other firms in the sample. This gain amounts to 600 million for the sample median (market) value of 23 billion.

Given this uncertain balance between costs and benefits it is no wonder that the empirical evidence on the relationship between CSR and (non financial) corporate performance is mixed.[13] The same occurs if we specifically focus on stock market performance measuring the consequences of CSR choices on shareholders' wealth. The interest for empirical research in this area is growing because almost 1 out of 9 dollars invested in total assets under management in the US are subject to a CSR screening.[14] Among recent contributions Barnea and Rubin (2010) <5> document that CSR investment is negatively related to insider ownership. The authors formulate an overinvestment hypothesis to interpret their findings: CSR positively affects shareholder value up to a given level. However, insiders invest in it for reputation purposes, and in particular when their ownership share is low. Fisman, Heal, and Nair (2006) <22> find in general a negative relation between CSR and firm value with KLD data. They however document that factors such as the presence of outside blockholders with board representation and competition on the product markets both determine

[11] See, among others, Yellen (1984) <46>, Shapiro and Stiglitz (1984) <43> and Akerlof (1982) <1> for shirking, turnover and gift exchange models.

[12] On the relationship between workers' intrinsic motivation and productivity see Ryan et al. (1991), Frey and Oberholzer-Gee (1997) <25> and Kreps (1997) <35>.

[13] As is obvious, results in this field crucially depend on methodologies, time periods, selected sample and performance variables. For evidence of a positive link see, among others, Ruf et al. (2001) <40>. Inconclusive findings are in McWilliams and Siegel (2001) <36> Aupperle, Caroll and Hatfield (1985) <3>. Negative links are found among others by Preston and O'Bannon (1997) <38> and Freedman and Jaggi (1986) <23>.

[14] The Report on Social Investing Trends (last available 2007) calculates that there were 2.71 trillion in the same year (increasing from 2.29 trillion dollars in 2005) invested in total assets under management which use one or more of the three core socially responsible investing strategies (screening, shareholder advocacy, and community investing). *http://www.socialinvest.org/pdf/SRI_Trends_ExecSummary_2007.pdf* .

a more positive relationship between CSR and profitability. Harjoto and Jo (2009) find that CSR is positively related to corporate governance by using corporate governance data from IRRC/RiskMetrics and CSR data from the KLD Socrates database on a panel dataset from 1993 to 2004 and attribute their results to the capacity of CSR of reducing conflicts between shareholders and non investing stakeholders. A similar result between CSR and corporate governance is obtained by Ammann, Oesch, and Schmid (2010) <2> while Kempf and Osthoff (2007) <33> find that buying stocks of companies with good social behavior and selling stocks of social underperformers generates an abnormal yearly return of up to 8.7

The relative performance of CSR and non-CSR stocks has also been analyzed by looking at ethically managed and non-ethically managed investment funds. Bauer, Koedijk and Otten (2002) <6> obtain mixed findings when comparing active strategies of the two types of funds, even though they document a learning process which gradually improves the performance of ethical investment fund managers. Geczy, Stambaugh and Levin (2005) <27> evaluate the specific cost of ethical fund management (that is, the restriction of the universe of investable stocks to those which meet socially responsible investment constraints) in terms of risk adjusted returns. This cost is shown to depend on the share of SR investment, views about asset pricing models (SR funds are less able to offer exposure to size and value factors than to the standard one CAPM factor), and the ability of stock managers.[15]

Back to the theoretical rationales advanced to interpret the relative performance of CSR stocks, the specificity of the Lehman event (and the nexus between its failure and ex ante CSR corporate governance and product quality ratings) is that it may have revealed to market investors the importance of the first (minimization of transaction costs with stakeholders) and fifth (CSR as a signal of product quality) potential beneficial effects of CSR on corporate performance, thereby giving rise to an upward (downward) correction of the value of stocks with good (bad) CSR scores.

Our paper deals with this issues and is divided into five sections (including introduction and conclusions). The second section describes the event under inquiry in more detail. Section 3 briefly presents our methodological approach. Section 4 illustrates the econometric findings, while some interpretations of them are provided in section 5. The sixth section concludes.

2. The Lehman event

Extremely high leverage, liquidity risk and overexposure in mortgage securitisation were the three main factors responsible for Lehman Brothers' risky position before the crisis. The $31:1$ leverage ratio implied that a $3-4\%$ reduction

[15] Other papers finding non significant differences in performance are those by Schroder (2007) <41>, and Statman and Glushkov (2007) <44>. However a negative effect of environmental and community screens is found by Brammer, Brooks and Pavelin (2006) <11>, while a negative effect for social screen by Renneboog, Horst and Zhang (2008) <39>.

in the value of its assets would eliminate its equity or book value.[16] Liquidity risk was implied by its asset liability mismatch. The SFAS 157 accounting rule on Fair Value classifies assets and liabilities in three levels in ascending order of liquidity (from Level I very liquid and easy to value to Level III illiquid and hard to value). Before the crisis Lehman had a dominant share of illiquid assets (218 out of 291 billion dollars) against mainly liquid liabilities (109 out of 149 billion were Level I). Third, as well known, Lehman was overexposed in securitizing residential mortgages (246 billions between 2006 and 2007). In this respect, as also well known, the move from the "originate to hold" to the "originate to distribute" model implied by the securitisation approach eliminated the standard arm-length relationship between lenders and borrowers with the perverse effect of not weakening the incentive to lend to mortgage holders with unsustainable debt service (interest payment to income) ratios. Even though worries about the company led to a sharp drop of its stock price even before Chapter 11, there were hopes for a different solution (i.e., a sale to Bank of America and Barclays) until the event date. Above all, no previous failures of the largest financial intermediaries had challenged the "too big to fail" assumption according to which large financial intermediaries should not be left go bankrupt due to the systemic consequences of their failure.

Advance notice that Lehman Brothers was filing for Chapter 11 arrived at 7 am of the 15 September 2008. The official news release came at $11:43$.

It is well known that the Lehman Brothers' default severely increased counterparty risk because the failed company had \$729 billion of notional derivative contracts, amounting to an estimated fair value of around \$16.6 billion at the event date. The same company disclosed that it had \$25.6 billion of over-the-counter currency, interest rate and credit default swaps.

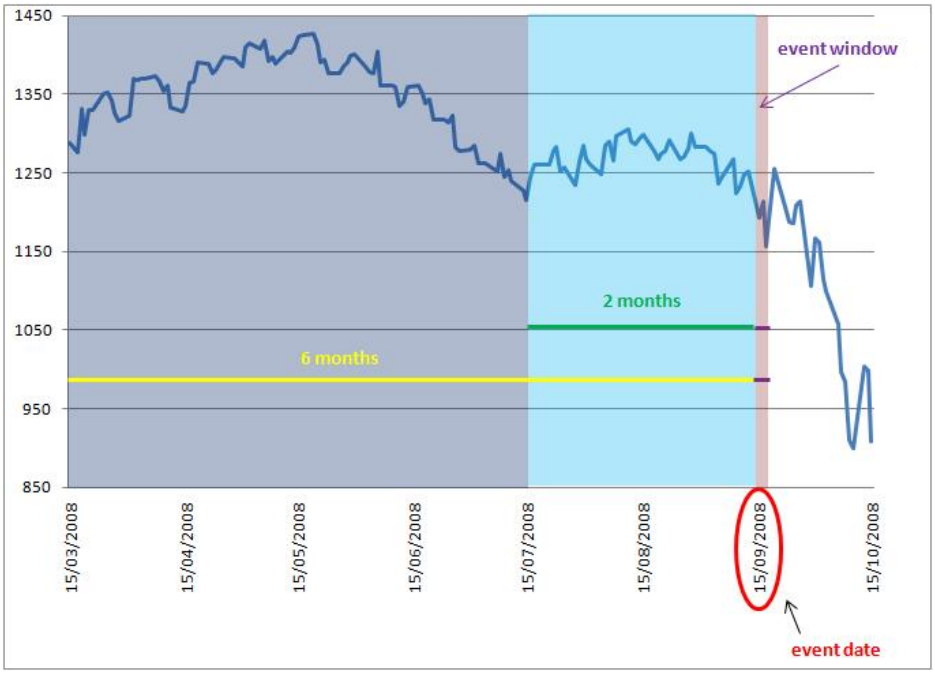
An even bigger problem was that the credit default swaps written on Lehman debt amounted to around \$350 billion. The settlement of these contracts would have probably triggered the default of the insuring party.

The above-described linkages between Lehman Brothers and many other actors in financial markets and the risk of additional defaults, coupled with uncertainty about the rescue plans of governments and central banks to prevent a collapse of the payment system, generated a -4.7% loss of the S&P500 Composite Index (S&P500) index at the event date. As shown in Figure 1 the event marked the beginning of a dramatic plunge in the Index during the following month.

What should be born in mind that the RiskMetrics-KLD social rating used in our analysis registered, before the crisis, concerns about Lehman Brothers. In fact RiskMetrics-KLD assigned to Lehman negative net scores in the two domains of corporate governance and product quality concerns (see section 3). Our purpose in what follows is therefore to test whether investors reacted with

[16] *http://www.secinfo.com/d11MXs.t5Bb.htm#1stPage*, Lehman 2007 Annual Report. See Item 6 on Page 29 for ratios.

Figure 1: **S&P**500 **Composite Index**



The figure shows S&P500 Composite Index level from six months (estimation window) before the event day to one month after.

Source: Elaboration on daily *Thomson Reuters Datastream* data.

a "flight to CSR quality" by punishing companies with weaknesses in the same two domains or, more generally, in all RiskMetrics-KLD domains.

3. Our theoretical hypotheses

Given the characteristics of the above-mentioned event, our assumption is that the Lehman episode induced investors to reassess (and increase) the weight of the impact that CSR quality signals on the fundamental value of stocks.

Let us assume that investors evaluate stocks according to a standard discounted dividend approach in which the stock price is

$$P^* = \sum_{t=0}^{\infty} \frac{D_0(1 + E[g_t])^t}{(1 + r)^t}$$

where D_0 is the current dividend and $E[g_t]$ is the yearly expected rate of growth of dividends. As well known, this standard approach becomes much

more complex if life of the firm is decomposed into a high growth period which is limited in time and followed by a "normal" one where the stock behaves as a terminal bond and grows forever at the rate of growth of the economy (Claus and Thomas, 2001 <16>). What practitioners use to calculate the denominator is generally a proxy of a risk-free rate plus an estimate of the risk premium multiplied by exposure to systematic non-diversifiable risk of the industry stocks.

Investors are imperfectly informed and can use as the nominator the expected growth rate of earnings derived from consensus forecasts by I/B/E/S analysts on-one and two-periods-ahead earnings per share - that can be considered the observed variable which is more akin to the rational expectations concept (Keane and Runkle, 1998 <32>) - as proxies for the expected rate of growth of dividends.

It is likely that the reliability of such forecasts (and investors' confidence in them) depends on the investors' perception of corporate trustworthiness. We accordingly expected that, within RiskMetrics-KLD domains, scores for corporate governance and product quality became signals of corporate trustworthiness increasingly taken into account by investors after the Lehman event. Three likely explanations about the channels through which this may occur may be provided (Fasan and Mio <21>). First, Lehman Brothers was weak in corporate governance and product quality domains in the RiskMetrics-KLD ratings. More specifically, it recorded a zero level of strengths in both Product Quality and Corporate Governance: it scored -1 and -2 for Product Quality and Corporate Governance concern respectively, according to the last RiskMetrics-KLD release before the crisis.[17] After the event, therefore, investors may have interpreted positive net scores in such domains as signals of corporate reputation which reduce the probability of negative surprises such as those that forced Lehman Brothers to default (see the introductory caption of section 1).

Second, the Lehman shock increased demand for transparency (Cornell and Shapiro, 1987 <17>) from non-investor stakeholders. In this perspective investors interpreted higher CSR scores as signals of greater corporate capacity to deal with such claims.

Third, (as a sort of second order effect) after the event, financial analysts not directly demanding greater transparency may have considered that closer and more trustworthy relationships with stakeholders (signaled by higher CSR scores) could reduce the post-crisis costs generated by the collapse of trust which would negatively affect economic relationships between corporations and some of their stakeholders (such as clients and suppliers). In this case good CSR ratings are expected to reduce (or to increase relatively less than in firms with bad CSR ratings) transaction costs with stakeholders after the event.

For these reasons we formulate the following hypotheses:

H1: CSR net scores (algebraic sum of strengths and weaknesses) positively affect abnormal returns on observed stocks at the Lehman event date.

[17] See Tables 1-3 for detailed statistics.

H2: corporate governance and product quality are two CSR signals affecting abnormal returns after the Lehman event

H3: financial analysts efficiently exploit CSR information: the significance of direct analytic scores on CSR strengths and weaknesses of the RiskMetrics-KLD database dominates that of affiliation to a CSR stock market index.

Note that hypothesis 2 can be generalised in the sense that an event like the Lehman filing generates a shift of investor focus and concerns over corporate downside risk, thereby increasing the weight attributed to signals related to product quality and corporate governance, since these two RiskMetrics-KLD specific domains are, by definition, those more informative with respect to such downside risk (and definitely more so than the other 6 CSR domains, i.e. community, diversity, employee relations, environment, human rights and controversial business industries). The fact that Lehman was weak exactly in the product quality and corporate governance domains reinforces the hypothesis on their dominant role in these particular critical scenarios.

4. Empirical Analysis and Results

A first important methodological step in an event study is the definition of the event window, that is, the period of interest over which the impact of an event is measured. The more days are included in the event window, the lower becomes the power of the methodology (Brown and Warner, 1980) <12>. In our case we select a five-day event window. Considering the nature of this unexpected event, abnormal returns are calculated starting from the day prior to the event (in order to take account of possible anticipation of the news), so that the event window is (-1;+3) with 0 as event day (see table 1 for descriptive statistics on AR_{-1} to AR_{+3}).

In order to compute normal returns of the stock we use the standard market model:

$$R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau} \tag{1}$$

where τ is the estimation window interval, $R_{i\tau}$ and $R_{m\tau}$ are the compounded continuous returns in τ of the security i in market m, respectively, and $\epsilon_{i\tau}$ is the zero mean disturbance term. In the literature the simple market model generally provides results which are robust to estimation of "normal returns" with its most common alternatives (Fama-French three factor models<20>, other multifactor models, ARCH/GARCH models).[18] This is because such alternatives have much higher probability of statistically insignificant parameters and therefore much higher noise on the normal return which is automatically transferred in the

[18]See among others Becchetti, Ciciretti and Hasan (2007) <7>.

measure of the abnormal return (Brown-Warner, 1985 <13>; Campbell et al., 1997 <14>).

The estimation window length is another key decision to take in event studies. If the normal market return model structure is expected to vary frequently across time (i.e. due time varying betas), a too long window may miss that change, under-representing the more recent normal market return structure. On the other hand, a too short estimation window may not have enough degrees of freedom to properly capture the model structure. Being aware of this, our first choice is a six months window, followed by a robustness check to control whether our results are confirmed with a shorter (2 months) window.[19] Using the market model as the normal performance return model, abnormal return is defined as the residual between the observed and the predicted return, as follows:

$$\widehat{AR}_{it} = \varepsilon^*_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R^*_m \tag{2}$$

where AR is calculated in the event window, while $\hat{\alpha}_i$ and $\hat{\beta}_i$ are coefficients estimated in (1).

A subsequent step is to regress the defined abnormal returns on their potential determinants which include CSR ratings (see section 4.3). The specifications are estimated with OLS with White heteroskedasticity robust standard errors. The latter allow account to be taken of the problem of spatial heteroskedasticity, which is typical in short run propagation mechanisms around a crisis event.

4.1. Data Definition

Our sample consists of 2,603 US listed stock companies is we consider the 6-month estimation period.[20] Daily prices, trading volumes, industry sectors (according to the Industry Classification Benchmark (ICB)) and number of employees (as a proxy for firm size) were collected using *Thomson Reuters Datastream*.[21] Daily returns are calculated as continuously compounded returns, that is, as the natural log of the ratio between P_t and P_{t-1}.

Affiliation to FTSE KLD 400 Social Index was taken from RiskMetrics historical spreadsheets (last 2007 release before Lehman event) as well as social rating. The FTSE KLD 400 Social Index is a market-capitalization-weighted stock index whose constituents are 400 publicly traded US companies that have met high standards of social and environmental excellence. RiskMetrics provides scores on strengths and weaknesses for sample stocks on seven specific

[19] All results in the rest of the paper are robust to the use of the 8-months, 4-months, 2-months estimation window as well as to that of truncated (and cut-off) distributions of AR(0) (1^{st} and 99^{th} centile) for all estimation windows.

[20] We start from 3,285 companies in RiskMetrics dataset which become 2,677 after cleaning for: data not available (for industry), database error (i.e. prices equal to zero or constant prices over time). Finally, using Brown and Warner (1985) <13> hypothesis, we end up with 2603 companies.

[21] According to ICB, industry sectors are (companies in our dataset): Basic Materials (101); Consumer Goods (228); Consumer Services (371); Financials (561); Healthcare (291); Industrials (448); Oil & Gas (154); Technology (332); Telecommunications (37); Utilities (80).

domains i) community; ii) corporate governance; iii) diversity; iv) employee relations; v) environment; vi) human rights; and vii) product quality; [22] We define the variable *netstrength* as the sum of strengths minus the sum of concerns for all possible CSR domains according to RiskMetrics social rating. Furthermore we create net indicators ($netstrengths_i$, where i stands for community, corporate governance, diversity, employee, environment, human rights and product) for each of the above domains i) to viii) as the algebraic sum between each domain strength and each domain concern (see Table 2 for details). Finally, news concerning Lehman Brothers, its timing and previous information about the company were collected using *Dow Jones Factiva*.

4.2. Descriptive Findings

In Tables $1-3$ we present descriptive statistics for the variables used in our empirical analysis. Table 1 documents that the average abnormal return across sample stocks is much higher at the event day (0.7%) than the day before (0.03%) and the day after (0.1%). Median abnormal returns express an even stronger difference among the same three days (-0.1%, 0.2% and 1.2% respectively). Descriptive statistics suggest that there is something not included in the "normal return" model at the event date. The econometric findings in the following section will provide evidence consistent with these first descriptive indications, showing that the impact of the event was not anticipated while, in some cases, it persisted after the event date. If we consider net RiskMetrics-KLD strengths reported in Table 2 (sum of strengths minus sum of weaknesses, defined as $netstrengths_i$) we find that the range shrinks from -11 to 15, whereas we see that, when aggregating RiskMetrics-KLD scores on the 8 CSR domains (the variable *totstr* is the sum of strengths in the 8 domains, whereas *totcon* is the sum of concerns), the maximum is 17 for weaknesses and 22 for strengths. Looking at specific domains we find that both corporate governance and product quality range from -4 to +2. More in general, Tables 2 and 3 provide extreme values for strengths and concerns for each individual CSR domain. Minima and maxima reported in these tables are used to calculate the maximum magnitude of the impact of a given CRS domain in our econometric findings. We define such maximum magnitude as the difference in abnormal returns between two stocks located at the two extremes of the value range. Finally, descriptive statistics of the natural log of employee variable (*logemployee*) which is used in the econometric analysis as a proxy for industry size, are also provided in Table 3.

4.3. Hypothesis testing

To test our hypotheses we ran parametric (t-test, J1 and J2) and non-parametric [sign (J3), Corrado rank (J4), and G-rank-t] tests for the entire

[22] Additional scores are provided for involvement in controversial business issues (alcohol, firearms, gambling, military, nuclear power, tobacco). Details on RiskMetrics-KLD criteria are provided in Appendix A.

sample (Table 4).[23] Table 4 (column 3) confirms that the event was not anticipated by the market. The result is also supported by the G-rank-t for the variable $AR(0)-AR(-1)$ in column (8) which documents as well a slow market reaction.

A Monte Carlo simulation was ran to evaluate the power of non-parametric tests. In particular we check if the frequency rate of rejection of H_0, when false (1-β), of G-Rank-t is bigger than frequency rate of Corrado rank test due to the power of the correction factor. Simulated panel with 2,603 securities and the stock market series (10,000 draws for each estimation window), each time series is modeled as a geometric Brownian motion (that fit better with respect to stock price movements):

$$dS = \mu S \Delta t + \sigma S dz, \tag{3}$$

where μ and s are, respectively, drift (the expected investor rate of return) and standard deviation. We perform the simulation with different μ and s starting from the (historical) values calculated on a sample period including estimation plus event window and following with μ and s of the estimation window, the event window,the event date, and finally the exponential μ and s The simulation is repeated with 1,000 draws. Average values of the G-Rank-t test for the 10,000 draws with the historical μ and s are reported in Table 5. Looking at the entire values of the G-Rank-t test coming from the Monte Carlo simulation, we observe that the test accepts with higher frequency the null hypothesis with respect to the Corrado rank test. This finding confirms the idea that the G-rank-t test is more reliable for this kind of macro events [see table 4 column (7) and (8)].

We also perform a random event date selection in order to check the (C)AR in a normal trading day. Three days are randomly selected with replacement from a population of 250 trading-days in 2008. Selection is made from a discrete uniform distribution. Abnormal returns in the randomly selected event days are

[23] J1 and J2 parametric tests verify the significance of our CARs. Under suspicion of a CAR variance bias due to AR aggregation the use of J2 is more appropriate since the J2 correction factor gives high weight to the observation with low variance. We reject the null hypothesis of J1 and J2 of absence of abnormal performance when |J1|,|J2|>1.64. Since abnormal returns are generally not normally distributed we also look at non-parametric tests. The null hypothesis of sign test is the equidistribution of C(AR)s signs around the median. Since the Lehman event has a negative impact on the market, the alternative hypothesis is in our case that the number of minus signs is larger than that of plus signs. We reject the null hypothesis when: Sign-Test<-1.64. The Corrado rank test assumes, under the null hypothesis that there is equidistribution in the distance of ranked C(AR)s from median rank. We reject the null hypothesis when |Corrado-Test|>1.64. The power of the Corrado test drops off rapidly as the number of the days in the CAR length increase (II type error-β). The G-rank-t (Kolari and Pynonnen, 2010 <34>) has the same null hypothesis of the Corrado test but is especially devised for macro events since return cross-correlation goes to zero by the properties of the G-Rank-t asymptotic distribution.

not significant (see Table 6).

Our findings are also substantially unaltered for 8-month, 6-month, 4-month and 2-month estimation windows: for instance, both net corporate governance (*netcgov*) and net product (*netpro*) remain significant at 5% for CAR(0;+2) (net corporate governance slightly decreases from 1.09% to 0.62% while net product quality goes from 1.42% to 1.41%).

Finally, we perform all the previous steps with cut-off and truncated distribution of abnormal returns at 1^{st} and 99^{th} centile for all estimation windows in order to eliminate potential outliers from our estimate.

4.4. Econometric Findings

Parametric and non parametric hypothesis testing and the robustness checks presented above documented the significance of abnormal returns in the selected event window. With our econometric analysis we may however test more properly the three hypotheses formulated in Section 3 by evaluating the magnitude of estimated (C)ARs net of the impact of standard controls. In order to test the first hypothesis we regress abnormal returns calculated at different intervals around the event date - AR(-1), AR(0), AR(+1), AR(+2), AR(+3) and CAR(0;+1) and CAR(0;+2) - on our *netstrength* variable, that is, the sum of strengths minus the sum of concerns from all possible CSR domains.

We estimate the effect of the aggregate *netstrength* variable on abnormal returns from the observed stocks under two different specifications which include among controls: i) *logemployees* as a proxy for firm size; ii) *industry dummies*. Without *industry dummies* (first specification) we have significant abnormal returns from the day before the event to the day +2, with positive and significant cumulative abnormal returns for CAR(0;+2) and CAR (0;+1) (Table 4, columns 1-7). The anomaly of the negative abnormal return the day before the event disappears when we include *industry dummies* (second specification). In the augmented specification the effect is now positive and significant in the event date and the day after, even though smaller in magnitude (Table 4, columns 8-14). The hypothesis of a significant impact of the CSR scores on abnormal returns at the event date is therefore not rejected by our data.

Among other regressors the size variable (*logemployee*) is negative and significant in days +1, +2 and +3 after controlling for *industry dummies*.[24]

Moving from statistical to economic significance, we focus on the event day effect in specification ii), finding that the maximum difference in magnitude of abnormal returns for two firms set at the two extremes of the total strength/ weaknesses distribution - two firms with the worst and the best possible CSR rating - is 5.07% (3.38% if we consider the distribution represented by the observed extremes of the net strength variable). The same two numbers for the

[24] If we adopt the Hong and Stein (1999) <30> framework of heterogeneity of investors with fundamentalist and less informed traders who just look at prices we could interpret this as a delayed effect caused by sales of uninformed traders under the assumption that their share is higher in large stocks.

CAR (0;+2) are respectively 11.39% and 7.54%. If we look at economic significance by considering the impact of a one standard deviation change we find that the net strength effects are .28%, .20%, and .64% respectively for AR(0), AR(0), and CAR$(0;+2)$.

In order to test hypothesis two ($H2$) we replace in Table 5 the aggregate *netstrength* indicator with net scores ($netstrengths_i$), namely strengths minus concerns recorded on each of the seven fields of CSR (community, corporate governance, diversity, employee relations, environment, human rights, product quality).

Results from estimates of the new specification clearly show that the two strongest and more persistent effects are those from corporate governance and product quality indicators (*netcgov* and *netpro*, the two CSR features on which Lehman had net negative scores). The corporate governance effect lasts three days (from the day before to the day after) and is positive and significant. The product quality effect materializes from day 0 to day 2. All other CSR domains (with the exception of environment the day before the event) are not significant if we look at the specification which includes *industry dummies* (Table 10, columns $1-7$). Cumulative abnormal returns are positive and strongly significant only for the corporate governance and product quality variables. Results from Table 5 support hypothesis two ($H2$) that the effect is concentrated on the CSR domains in which Lehman was weaker.

The magnitude of the effect of the significant net scores over specific CSR domains is again not negligible (the estimates in Table 10 correcting for *industry dummies* imply that a unit change in the corporate governance (product quality) net score generates a 1% (1.4%) CAR(0;+2)). This implies a difference in abnormal returns of 3.59% for the AR(0) and 7.02% for the CAR(0;+2) for two stocks located respectively at the left to the right extreme of the net corporate governance indicator. For the product quality indicator the same two numbers are 3.19% and 10.15%. If we look at the impact of one standard deviation change of the same two net scores we have 1.17%(.98%), .74%(.95%), and 2.36%(3.19%) respectively for AR(0), AR(1), and CAR$(0;+2)$.

In order to test hypothesis three ($H3$) we add a dummy for stocks included in the FTSE KLD 400 Social Index (reported as FTSE KLD 400 in Tables 9, and 10) to evaluate the relative weight given by investors to information from analytic CSR scores vis á vis information from CSR index affiliation. The hypothesis on the significance of this variable may be seen as a test on the importance of passive investors' buy and hold strategies on the FTSE KLD 400 Social Index. The *domini* dummy is neither significant in the specification with the aggregate net strength indicator (Table 6), nor in that with net strengths for individual CSR domains (Table 7). These findings confirm that investors have access to analytic CSR scores and exploit their higher informative content.

What we have assumed so far by creating a unique net strength index is that the stock market reaction to strengths and weaknesses is symmetric. In Table 8 we disaggregate strengths and concerns of different CSR domains and find

that reaction to concerns lasts longer than that to strengths. More specifically, corporate governance concerns (*cgovcon*) have a three day effect (from the day before to two days after the event date), while corporate governance strengths (*cgovstr*) are significant only at the event day. Cumulative average abnormal returns are however not so dissimilar. The difference between the strength and the concern indicators in the product quality domain is more marked. The impact of the event on product quality lasts three days when we look at concerns (*procon*), while it is not significant when we consider strengths (*prostr*). The CAR(0;+2) attributable to the concern indicator is 1.09%. If we look at the impact of a one standard deviation change for the corporate governance (product quality) concern scores we get $-1.11\%(-1.27\%)$, $-.69\%(-1.19\%)$, and $-2.45\%(-3.80\%)$ respectively for AR(0), AR(1), and CAR$(0;+2)$. We interpret this asymmetry as due to the fact that concerns impact on downside price risk and probability of default and therefore affect the reassessment of the stock evaluation after the Lehman Brothers event more than strengths (see again the introductory caption in section 1).

5. Further interpretation of our findings

As in any event study an abnormal return may be determined by the *impact of the event* or by a *reassessment of the stand alone value of the stock*. Our interpretation of the findings presented in the previous sections is that CSR rated quality is a signal of both.

In the former case the event itself creates a more risky financial market environment which affects stock evaluation (and risk of default). The market value revision may be proportional to the rated corporate governance quality, which is interpreted as a proxy for the counterpart risk run by the firm (i.e. weight of positions in financial derivatives).

In the latter case (*reassessment of the stand alone value*) our result may be due to the fact that financial analysts correct their underestimation of the importance of social responsibility and quality of corporate governance in terms of signals of reduced default risk in a framework of asymmetric information. The fact that the CSR factors which are more significant are corporate governance and product quality (the only two factors on which Lehman Brothers had net negative scores) is consistent with this interpretation. More specifically, what we measure is not a general effect of product quality and corporate governance RiskMetrics-KLD ratings on stock market returns but the reassessment of their effect on them after the Lehman event, which shifted the focus of investors to downside risk. This explain the asymmetric effect of ratings (product quality weaknesses having more impact than strengths in Table 8).

It is not possible to disentangle these two (*impact of the event* and *reassessment of the stand alone value*) effects also because they are strictly correlated.

Another relevant finding in our regressions (even though not confirmed in sign and rank non parametric tests which however do not fully take into account for AR magnitudes) is the slow market reaction to the event. In the Lehman story both prior notice and the official release occurred on the same trading

day (15 of September) so that the 16 of September is definitely a post-event trading day. Nevertheless, we observe in many estimates (see Tables $4-8$) that the reaction continued on this and on the following day with abnormal returns which were mostly in the same direction as on the event day. The phenomenon of slow market reaction has been thoroughly investigated in the recent financial literature and three main explanations may apply to our case. First, Daniel et al. 1997 <18> point to overconfidence and biased self-attribution by assuming that investors overreact to private and underreact to public information. A second line of thought (Barberis et al., 1998 <4>) hinges on representative heuristics and argues that investors overreact to news. A third approach (Hong and Stein, 1999 <30>) assumes the existence of two types of traders. The first look at news while the second reacts only to prices. This implies underreaction (only the first group reacts to the news) and subsequent overreaction (the second group reacts to price changes).

6. Conclusions

Corporate governance and product quality are two fundamental factors affecting corporate performance and stock market value. In a framework of asymmetric information, investors are imperfectly informed about these two factors and have to formulate their expectations by extracting signals on them. One of the sources of these signals is CSR rating agencies.

The hypothesis set forth in our paper is that the Lehman Brothers event (the failure of such an important company which exhibited positive financial ratings but negative CSR ratings on corporate governance and product quality) may have led investors to reassess the value of the stocks by increasing the weight attributed to specific CSR information or to consider a stronger negative impact of the event on stocks with similar weaknesses.

Our empirical findings demonstrate that, by using the same sources which produced the above mentioned negative ratings on Lehman (the RiskMetrics-KLD database), net strengths on corporate governance and product quality generate significant abnormal returns around the event date on a sample of around $2,600$ stocks listed on the US stock exchange. We also document that investors do not react to stock inclusion in the FTSE KLD 400 Social Index but rationally look at the single analytical scores and attribute, among them, more weight to the two (corporate governance and product quality) in which Lehman was weaker. This can also be explained by the fact that CSR index affiliation is a weaker signal which contains a lot of noise due to the fixed number of index constituents problem and to the existence of a waiting list of top CSR firms which are not included in the index.[25]

Another important element in our regression results is that financial market reaction to the shock extends beyond the event date. This is consistent (among other possible interpretations) with the hypothesis of a heterogeneous market

[25] See Appendix B for further details.

microstructure in which more informed traders react first and a group of followers, looking only at price signals, react secondly once they have observed the price dynamics.

A more general result of our paper is that investors seem to discover, after the event, that CSR ratings perform a crucial role in financial markets by providing original information which is not captured by traditional financial rating indicators and not already incorporated into prices.

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Table 1: **Distribution of abnormal returns around the event date.**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) AR(0)-AR(-1)	(7) CAR(0;+1)	(8) CAR(0;+2)
Mean	0.0000	0.0055	0.0011	0.0029	0.0159	0.0055	0.0066	0.0096
Median	-0.0014	0.0122	0.0026	0.0039	0.0074	0.0141	0.0126	0.0184
Sd	0.0362	0.0748	0.0496	0.0603	0.0716	0.0839	0.0907	0.1207
Skewness	-3.8142	-18.8776	-3.0647	-6.3612	0.6913	-11.3455	-9.3110	-8.4435
Kurtosis	73.6837	623.1067	42.1203	124.5743	39.1772	319.7233	199.4861	169.6568
Min	-0.7154	-2.6386	-0.8127	-1.2361	-1.0752	-2.5015	-2.3370	-2.9564
Max	0.2006	0.2473	0.3016	0.3971	0.8778	0.5710	0.3554	0.4000
P1	-0.0864	-0.1464	-0.1513	-0.1397	-0.1257	-0.1924	-0.2042	-0.2835
P5	-0.0439	-0.0798	-0.0642	-0.0666	-0.0667	-0.1186	-0.0955	-0.1357
P10	-0.0304	-0.0476	-0.0454	-0.0462	-0.0469	-0.0718	-0.0597	-0.0848
P25	-0.0159	-0.0109	-0.0187	-0.0197	-0.0207	-0.0154	-0.0208	-0.0307
P75	0.0143	0.0319	0.0264	0.0277	0.0432	0.0399	0.0446	0.0631
P90	0.0370	0.0539	0.0484	0.0579	0.0867	0.0695	0.0782	0.1117
P95	0.0549	0.0711	0.0652	0.0779	0.1266	0.0932	0.1008	0.1494
P99	0.0934	0.1145	0.1100	0.1286	0.2365	0.1469	0.1568	0.2198
Observations	2603	2603	2603	2603	2603	2603	2603	2603

AR(-1): abnormal return in the day prior to the event date. **AR(0)**: abnormal return in the event date. **AR(+1)**: abnormal return in the day which follows the event date. **AR(+2)**: abnormal return two days after the event date. **AR(+3)**: abnormal return three days after the event date. **CAR(0;+1)**: cumulative abnormal return over the event date and the following day. **CAR(0;+2)**: cumulative abnormal return over the event date, the following day and two days after.

Table 2: **Distribution of RiskMetrics-KLD ratings in net and total CSR domains.**

VARIABLES	(1) Netstr	(2) Netcom	(3) Netcgov	(4) Netdiv	(5) Netemp	(6) Netenv	(7) Nethum	(8) Netpro	(9) Totstr	(10) Totcon
Mean	-0.6808	0.0158	-0.2493	0.1752	-0.2416	-0.0814	-0.0430	-0.1863	1.3869	2.0676
Median	-1	0	0	0	0	0	0	0	1	2
Sd	2.2664	0.5068	0.7746	1.2744	0.8857	0.6427	0.2245	0.5851	2.1550	1.9721
Skewness	0.6587	1.9589	-0.2671	1.2931	0.0727	-1.2801	-5.2586	-2.3155	3.3741	2.0711
Kurtosis	7.7284	16.4456	3.2345	4.9708	5.1364	16.2103	38.1003	11.3058	19.5173	9.1237
Min	-12	-2	-4	-2	-4	-5	-3	-4	0	0
Max	15	4	2	7	5	4	1	2	22	15
P1	-6	-1	-2	-1	-3	-3	-1	-2	0	0
P5	-4	-1	-1	-1	-2	-1	0	-1	0	0
P10	-3	0	-1	-1	-1	-1	0	-1	0	0
P25	-2	0	-1	-1	-1	0	0	0	0	1
P75	0	0	0	1	0	0	0	0	2	3
P90	2	0	1	2	1	0	0	0	3	4
P95	3	1	1	3	1	1	0	0	5	6
P99	6	2	1	4	2	2	0	1	11	10
Observations	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603

Netstr is the sum of strengths minus the sum of concerns in all possible CSR domains according to RiskMetrics-KLD ratings. **Netcom** is the sum of strengths minus the sum of concerns in the community domain according to RiskMetrics-KLD ratings. **Netcgov** is the sum of strengths minus the sum of concerns in the corporate governance domain according to RiskMetrics-KLD ratings. **Netdiv** is the sum of strengths minus the sum of concerns in the diversity domain according to RiskMetrics-KLD ratings. **Netemp** is the sum of strengths minus the sum of concerns in the employee domain according to RiskMetrics-KLD ratings. **Netenv** is the sum of strengths minus the sum of concerns in the environment domain according to RiskMetrics-KLD ratings. **Nethum** is the sum of strengths minus the sum of concerns in the human rights domain according to RiskMetrics-KLD ratings. **Netpro** is the sum of strengths minus the sum of concerns in the product quality domain according to RiskMetrics-KLD ratings. **Totstr** is the sum of each strength for each company in the sample according to RiskMetrics-KLD rating. **Totcon** is the sum of each concern for each company in the sample according to RiskMetrics-KLD ratings.

Table 3: **Distribution of RiskMetrics-KLD ratings in CSR domains**.

VARIABLES	(11) Comstr	(12) Cgovstr	(13) Divstr	(14) Empstr	(15) Envstr	(16) Humstr	(17) Prostr	(18) Comcon	(19) Cgovcon	(20) Divcon	(21) Empcon	(22) Envcon	(23) Humcon	(24) Procon	(25) Logempl.
Mean	0.1202	0.20131	0.60738	0.28121	0.12755	0.0046	0.0446	0.1045	0.4506	0.4322	0.5229	0.2090	0.0476	0.2309	7.7807
Median	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.8079
Sd	0.4527	0.4297	1.0467	0.6125	0.4777	0.0678	0.2173	0.3207	0.6281	0.5152	0.7088	0.6274	0.2353	0.5696	1.8956
Skewness	4.9540	2.1049	2.1893	2.6307	4.7528	14.6260	5.0726	2.9974	1.3455	0.4923	1.3601	3.7227	5.5196	2.8873	-0.1403
Kurtosis	33.1317	7.9248	8.3326	11.3466	29.1444	214.9213	30.0889	11.4404	4.9858	1.7516	4.8738	18.9467	38.1582	12.2693	3.0842
Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6931
Max	5	3	7	5	4	1	2	2	4	2	4	5	3	4	12.9622
P1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0910
P5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5643
P10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.3845
P25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.5320
P75	0	0	1	0	0	0	0	0	1	1	1	0	0	0	9.0722
P90	0	1	2	1	0	0	0	0	1	1	1	1	0	1	10.2146
P95	1	1	3	2	1	0	0	1	2	1	2	2	0	1	10.8249
P99	2	1	5	3	3	0	1	1	2	1	3	3	1	3	12.1799
Observations	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2493

Comstr is the level of strengths in the community domain according to RiskMetrics-KLD rating. **Cgovstr** is the level of strengths in the corporate governance domain according to RiskMetrics-KLD ratings. **Divstr** is the level of strengths in the diversity domain according to RiskMetrics-KLD ratings. **Empstr** is the level of strengths in the corporate employee domain according to RiskMetrics-KLD ratings. **Envstr** is the level of strengths in the environment domain according to RiskMetrics-KLD ratings. **Humstr** is the level of strengths in the corporate human rights domain according to RiskMetrics-KLD ratings. **Prostr** is the level of strengths from product quality domain according to RiskMetrics-KLD ratings. **Comcon** is the level of concerns in the community domain according to RiskMetrics-KLD ratings. **Cgovcon** is the level of concerns in the corporate governance domain according to Riskmetrics-KLD ratings. **Divcon** is the level of concerns in the diversity domain according to RiskMetrics-KLD ratings. **Empcon** is the level of concerns in the corporate employee domain according to RiskMetrics-KLD ratings. **Envcon** is the level of concerns in the environment domain according to RiskMetrics-KLD ratings. **Humcon** is the level of concerns in the corporate human rights domain according to RiskMetrics-KLD ratings. **Procon** is the level of concerns in the product quality domain according to RiskMetrics-KLD ratings. **Logempl.** is natural log of the number of employees in the firm.

Table 4: **Parametric (t-test, J1 and J2), and non-parametric (Sing, Corrado rank, and G-rank-t) robustness test**

VARIABLES	(1) mean	(2) Obs	(3) t-test	(4) J1	(5) J2	(6) Sign test	(7) Corrado Rank test	(8) G-Rank-t test
AR(-1)	0.0000	2603	0.04	-	-	3.16	2.12**	1.10
AR(0)	0.0055	2603	3.74***	-	-	-15.03***	2.18**	1.11
AR(+1)	0.0011	2603	1.18	-	-	-3.47***	2.23**	1.11
AR(+2)	0.0029	2603	2.47***	-	-	-4.61***	2.27**	1.12
AR(+3)	0.0159	2603	11.34***	-	-	-6.80***	2.96***	1.18
AR(0)-AR(-1)	0.0055	2603	3.32***	0.07	3.29***	-12.92***	2.12**	5.15***
CAR(0;+1)	0.0066	2603	3.73***	0.16	14.65***	-11.00***	0.98	2.21**
CAR(0;+2)	0.0096	2603	4.04***	0.19	23.99***	-10.05***	0.98	1.09

The table above illustrates parametric and non-parametric tests applied to the overall sample. t-test is the standard t-student test. Under suspicion of a CAR variance bias due to AR aggregation the use of J2 is more appropriate since the J2 correction factor gives high weight to the observation with low variance. We reject the null hypothesis of J1 and J2 of absence of abnormal performance when $|J1|,|J2|>1.64$. Since abnormal returns are generally not normally distributed we also look at non-parametric tests. The null hypothesis of sign test is the equidistribution of C(AR)s signs around the median. Since the Lehman event has a negative impact on the market, the alternative hypothesis is in our case that the number of minus signs is larger than that of plus signs. We reject the null hypothesis when: Sign-Test<-1.64. The Corrado rank test assumes, under the null hypothesis that there is equidistribution in the distance of ranked C(AR)s from median rank. We reject the null hypothesis when $|$Corrado-Test$|>1.64$. The power of the Corrado test drops off rapidly as the number of the days in the CAR length increase (II type error-β). The G-rank-t (Kolari and Pynonnen, 2010 <34>) has the same null hypothesis of the Corrado test but is especially devised for macro events since returns cross-correlation goes to zero by the properties of the G-Rank-t asymptotic distribution.

Table 5: **G-rank-t test for all samples estimation windows and for Monte Carlo Simulation (MCS).**

	Sample				MCS			
VARIABLES	(1) 8 months	(2) 6 months	(3) 4 months	(4) 2 months	(5) 8 months	(6) 6 months	(7) 4 months	(8) 2 months
AR(-1)	2.10**	1.10	1.08	0.81	1.00	1.00	1.00	1.00
AR(0)	2.12**	1.11	1.11	0.86	1.00	1.00	1.00	1.00
AR(+1)	2.13**	1.11	1.10	0.87	1.00	1.00	1.00	1.00
AR(+2)	2.13**	1.12	1.11	0.86	1.00	1.00	1.00	1.00
AR(+3)	2.23**	1.18	1.18	0.99	0.08	0.09	0.11	0.16
AR(0)-AR(-1)	1.51	5.15***	6.04***	6.42***	1.00	1.00	1.00	1.00
CAR(0;+1)	2.10**	2.21**	2.18**	1.61	1.00	1.00	1.00	1.00
CAR(0;+2)	2.10**	1.09	1.07	0.79	1.00	1.00	1.00	1.00

The table above illustrates non-parametric G-Rank-t test for the all samples estimation windows for both sample and MCS. The results on columns (5), (6), (7), (8) are the average value of the G-Rank-t test for the 10000 draw.

Table 6: **G-rank-t test for random data on all samples estimation windows.**

VARIABLES	(1) 8m	(2) 6m	(3) 4m	(4) 2m	(5) 8m	(6) 6m	(7) 4m	(8) 2m	(9) 8m	(10) 6m	(11) 4m	(12) 2m
AR(-1)	1.15	0.98	0.86	0.89	1.06	1.17	1.16	0.98	0.99	1.11	1.12	0.77
AR(0)	1.14	0.98	0.86	0.94	1.06	1.17	1.16	1.10	0.99	1.11	1.13	0.80
AR(+1)	1.15	0.99	0.87	0.93	1.06	1.17	1.16	1.10	0.99	1.11	1.13	0.83
AR(+2)	1.15	0.99	0.87	0.94	1.06	1.17	1.16	1.10	0.99	1.11	1.13	0.81
AR(+3)	1.16	1.00	0.89	0.96	1.06	1.17	1.16	1.10	0.99	1.11	1.12	0.82
AR(0)-AR(-1)	1.14	0.98	0.86	0.93	1.06	1.17	1.16	1.11	0.99	1.11	1.12	0.80
CAR(0;+1)	1.15	0.98	0.86	0.93	1.06	1.17	1.16	1.10	0.99	1.11	1.12	0.81
CAR(0;+2)	1.15	0.99	0.86	0.93	1.06	1.17	1.16	1.11	0.99	1.11	1.12	0.81

The table above illustrates non-parametric G-rank-t test for random data on all sample estimation windows. (1), (2), (3) and (4) refers to the random selection for the 4/21/2008. (5), (6), (7) and (8) refers to the random selection for the 8/18/2008. (9), (10), (11) and (12) refers to the random selection for the 9/2/2008. 8m, 6m, 4m, and 2m are 8,6,4 and 2-month estimation windows respectively.

Table 7: **The effect of net overall CSR strengths on abnormal and cumulative abnormal returns**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) CAR(0;+1)	(7) CAR(0;+2)	(8) AR(-1)	(9) AR(0)	(10) AR(+1)	(11) AR(+2)	(12) AR(+3)	(13) CAR(0;+1)	(14) CAR(0;+2)
Netstr	-0.000843**	0.00258***	0.000756**	0.00113***	0.000772	0.00333***	0.00447***	0.00005	0.00135**	0.000881**	0.000707	0.000489	0.00223***	0.00294***
	(-1.993)	(4.777)	(1.975)	(2.653)	(1.296)	(4.371)	(4.516)	(0.123)	(2.411)	(2.212)	(1.593)	(0.801)	(2.705)	(2.765)
Logemployee	-0.000746*	0.00246***	-0.00296***	0.000319	-0.00828***	-0.000501	-0.000182	0.000390	0.000612	-0.00132**	-0.000633	-0.00623***	-0.000708	-0.00134
	(-1.897)	(4.055)	(-5.688)	(0.624)	(-13.24)	(-0.568)	(-0.161)	(0.911)	(0.853)	(-2.313)	(-1.039)	(-9.807)	(-0.674)	(-0.954)
Industry dummies	NO	NO	NO	NO	NO	NO	NO	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	0.00588*	-0.0102**	0.0249***	0.00303	0.0797***	0.0147**	0.0177**	0.00855**	-0.00990	0.00380	-0.0168***	0.0739***	-0.00610	-0.0229
	(1.811)	(-2.086)	(5.853)	(0.705)	(14.90)	(2.073)	(1.971)	(2.008)	(-1.437)	(0.499)	(-2.690)	(12.18)	(-0.498)	(-1.386)
Observations	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603
R-squared	0.004	0.021	0.016	0.003	0.058	0.011	0.011	0.151	0.173	0.050	0.048	0.105	0.057	0.070

(Robust t-statistics) in parentheses
*** p<0.01; ** p<0.05; * p<0.1

The table illustrates results from estimates of the following model: $(C)AR_i = Const_i + \beta_1 Netstr_i + \beta_2 Logemployee_i + \sum_{j=1}^{10} \beta_{3,j} Industry_j + \epsilon_i$ where abnormal returns and cumulative abnormal returns of various length are the dependent variables in different columns. **Netstr** is the sum of strengths minus the sum of concerns from all possible CSR domain according to RiskMetrics-KLD ratings. **Logemployee** is the natural log of the number of employees in the firm. **Industry** is the j-th industry dummy which takes value 1 if the company belongs to the j-th industry according to the Industry Classification Benchmark (ICB)and 0 otherwise. The regression is estimated with OLS and White heteroskedasticity robust standard errors. Abnormal returns are calculated as $AR_i = R_i - E[R_i|X]$, where $E[R_i|X]$ is estimated using the market model $R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau}$ for 6-month estimation window and $CAR_i(0;+1) = AR_i(0) + AR_i(1)$.

Table 8: **The effect of specific CSR domain strengths on abnormal and cumulative abnormal returns**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) CAR(0;+1)	(7) CAR(0;+2)	(8) AR(-1)	(9) AR(0)	(10) AR(+1)	(11) AR(+2)	(12) AR(+3)	(13) CAR(0;+1)	(14) CAR(0;+2)
Netcom	0.000101	0.00329	0.00301	-0.000172	0.00338	0.00630*	0.00613	0.000329	0.00300	0.00255	-0.000531	0.00308	0.00555	0.00502
	(0.0682)	(1.353)	(1.503)	(-0.0897)	(1.267)	(1.748)	(1.291)	(0.228)	(1.268)	(1.272)	(-0.278)	(1.194)	(1.523)	(1.054)
Netcgov	0.00247**	0.00524***	0.00371***	0.00198	0.00215	0.00895***	0.0109***	0.00205*	0.00514***	0.00325***	0.00202	0.000213	0.00839***	0.0104***
	(2.240)	(3.683)	(3.201)	(1.346)	(1.072)	(4.427)	(4.054)	(1.946)	(3.690)	(2.803)	(1.360)	(0.105)	(4.079)	(3.842)
Netdiv	-0.00121**	0.00115	-0.00123*	0.000535	0.000881	-0.00008	0.000450	-0.000147	-0.000377	-0.000947	0.000522	-0.00002	-0.00132	-0.000801
	(-2.128)	(1.479)	(-1.673)	(0.646)	(0.828)	(-0.0730)	(0.289)	(-0.265)	(-0.511)	(-1.303)	(0.643)	(-0.0241)	(-1.160)	(-0.530)
Netemp	0.00247**	-0.00116	0.00272***	-0.000566	0.000893	0.00157	0.001000	0.000829	0.00111	0.00139	0.000385	0.000125	0.00250	0.00289
	(2.562)	(-1.068)	(2.781)	(-0.584)	(0.648)	(1.018)	(0.497)	(0.837)	(1.112)	(1.392)	(0.400)	(0.0932)	(1.642)	(1.439)
Netenv	-0.00949***	0.00784***	-0.00184	0.00256*	-0.00123	0.00601**	0.00857***	-0.00407***	-0.000101	-0.000201	-0.00118	-0.000105	-0.000301	-0.00148
	(-8.115)	(4.492)	(-1.338)	(1.712)	(-0.826)	(2.480)	(2.817)	(-3.957)	(-0.0659)	(-0.133)	(-0.793)	(-0.0677)	(-0.124)	(-0.502)
Nethum	0.00374	0.00479	-0.00538*	-0.000421	0.00179	-0.000589	-0.00101	0.00758	-0.00154	-0.00400	-0.00008	0.00198	-0.00554	-0.00563
	(0.649)	(1.368)	(-1.664)	(-0.126)	(0.523)	(-0.120)	(-0.148)	(1.303)	(-0.497)	(-1.255)	(-0.0260)	(0.573)	(-1.140)	(-0.849)
Netpro	0.00103	0.00411	0.00278*	0.00736***	-0.00208	0.00689*	0.0142***	0.000977	0.00456*	0.00430***	0.00568***	0.00181	0.00886**	0.0145***
	(0.676)	(1.463)	(1.801)	(3.739)	(-0.977)	(1.801)	(2.703)	(0.668)	(1.722)	(2.678)	(2.941)	(0.863)	(2.365)	(2.828)
Logemployee	0.000162	0.00318***	-0.00207***	0.00110*	-0.00848***	0.00112	0.00222*	0.00102**	0.00179***	-0.000318	0.000180	-0.00603***	0.00147	0.00165
	(0.301)	(4.829)	(-3.297)	(1.784)	(-10.52)	(1.146)	(1.835)	(2.069)	(2.586)	(-0.482)	(0.273)	(-7.595)	(1.403)	(1.246)
Industry dummies	NO	NO	NO	NO	NO	NO	NO	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	0.000374	-0.0149***	0.0194***	-0.00191	0.0809***	0.00442	0.00252	0.00153	-0.0166**	-0.00111	-0.0218***	0.0735***	-0.0178	-0.0395**
	(0.0931)	(-2.926)	(4.046)	(-0.390)	(12.81)	(0.588)	(0.270)	(0.345)	(-2.443)	(-0.138)	(-3.364)	(10.74)	(-1.429)	(-2.412)
Observations	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603
R-squared	0.037	0.034	0.024	0.011	0.059	0.020	0.023	0.159	0.180	0.056	0.052	0.105	0.068	0.082

(Robust t-statistics) in parentheses
*** p<0.01; ** p<0.05; * p<0.1

The table illustrates results from estimates of the following model: $(C)AR_i = Const_i + \sum_{i=1}^{7} \beta_{1,i} Netstr_i + \beta_2 Logemployee_i + \sum_{j=1}^{10} \beta_{3,j} Industry_j + \epsilon_i$ where abnormal returns and cumulative abnormal returns of various length are the dependent variables in different columns. $\mathbf{Netstr}_i$ represents for each CSR domain the sum of strengths minus the sum of concerns according to RiskMetrics-KLD ratings, where i stands for community, corporate governance, diversity, employee, environment, human rights and product quality. **Logemployee** is the natural log of the number of employees in the firm. **Industry** is the j-th industry dummy which takes value 1 if the company belongs to the j-th industry according to the Industry Classification Benchmark (ICB) and 0 otherwise. The regression is estimated with OLS and White heteroskedasticity robust standard errors. Abnormal returns are calculated as $AR_i = R_i - E[R_i|X]$, where $E[R_i|X]$ is estimated using the market model $R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau}$ with a 6-month estimation window and $CAR_i(0;+1) = AR_i(0) + AR_i(1)$.

Table 9: **The effect of net overall CSR strengths on abnormal and cumulative abnormal returns (augmented specification)**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) CAR(0;+1)	(7) CAR(0;+2)
Netstr	0.00005	0.00126**	0.000868*	0.000727	0.000627	0.00213**	0.00286**
	(0.129)	(2.148)	(1.876)	(1.560)	(0.952)	(2.379)	(2.564)
FTSE KLD 400	-0.000106	0.00173	0.000239	-0.000382	-0.00263	0.00197	0.00158
	(-0.0676)	(0.657)	(0.0869)	(-0.159)	(-0.749)	(0.475)	(0.313)
Logemployee	0.000397	0.000497	-0.00134**	-0.000608	-0.00606***	-0.000838	-0.00145
	(0.881)	(0.652)	(-2.101)	(-0.943)	(-8.697)	(-0.736)	(-0.957)
Industry dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	0.00852**	-0.00945	0.00386	-0.0169***	0.0733***	-0.00559	-0.0225
	(1.977)	(-1.352)	(0.510)	(-2.682)	(11.83)	(-0.457)	(-1.361)
Observations	2603	2603	2603	2603	2603	2603	2603
R-squared	0.151	0.173	0.050	0.048	0.105	0.057	0.070

(Robust t-statistics) in parentheses
*** p<0.01; ** p<0.05; * p<0.1

The table illustrates results from estimates of the following model: $(C)AR_i = Const_i + \beta_1 Netstr_i + \beta_2 Domini_i + \beta_3 Logemployee_i + \sum_{j=1}^{10} \beta_{4,j} Industries_j + \epsilon_i$ where abnormal returns and cumulative abnormal returns of various length are the dependent variables in different columns. **Netstr** is the sum of strengths minus the sum of concerns from all possible CSR domain according to RiskMetrics-KLD rating. **Domini** is a dummy variable taking value 1 if the company belongs only to FTSE KLD 400 or to both FTSE KLD 400 and $S\&P500$ and 0 otherwise. **Logemployee** is the natural log of the number of employees in the firm. **Industry** is the j-th industry dummy which takes value 1 if the company belongs to the j-th industry according to the Industry Classification Benchmark (ICB) and 0 otherwise. The regression is estimated with OLS and White heteroskedasticity robust standard errors. Abnormal returns are calculated as $AR_i = R_i - E[R_i|X]$, where $E[R_i|X]$ is estimated using the market model $R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau}$ with a 6-month estimation window and $CAR_i(0;+1) = AR_i(0) + AR_i(1)$.

Table 10: **The effect of overall CSR strengths compared to the CSR index affiliation effect**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) CAR(0;+1)	(7) CAR(0;+2)
Netcom	0.000231	0.00272	0.00242	-0.000580	0.00330	0.00514	0.00456
	(0.161)	(1.154)	(1.182)	(-0.303)	(1.263)	(1.403)	(0.956)
Netcgov	0.00207*	0.00519***	0.00327***	0.00203	0.000172	0.00846***	0.0105***
	(1.960)	(3.717)	(2.837)	(1.362)	(0.0851)	(4.115)	(3.861)
Netdiv	-0.000228	-0.000611	-0.00106	0.000482	0.000155	-0.00167	-0.00119
	(-0.399)	(-0.813)	(-1.439)	(0.577)	(0.146)	(-1.432)	(-0.771)
Netemp	0.000786	0.000988	0.00133	0.000363	0.000221	0.00232	0.00268
	(0.786)	(0.986)	(1.327)	(0.378)	(0.164)	(1.524)	(1.342)
Netenv	-0.00420***	-0.000484	-0.000381	-0.00125	0.000191	-0.000865	-0.00211
	(-4.002)	(-0.299)	(-0.234)	(-0.814)	(0.121)	(-0.330)	(-0.670)
Nethum	0.00744	-0.00193	-0.00418	-0.000154	0.00228	-0.00611	-0.00627
	(1.275)	(-0.615)	(-1.294)	(-0.0461)	(0.656)	(-1.241)	(-0.933)
Netpro	0.000909	0.00436*	0.00421***	0.00564***	0.00196	0.00857**	0.0142***
	(0.621)	(1.662)	(2.583)	(2.934)	(0.936)	(2.291)	(2.780)
FTSE KLD 400	0.00131	0.00378	0.00177	0.000654	-0.00291	0.00555	0.00620
	(0.816)	(1.375)	(0.621)	(0.259)	(-0.822)	(1.278)	(1.152)
Logemployee	0.000948*	0.00158**	-0.000417	0.000144	-0.00587***	0.00116	0.00131
	(1.847)	(2.162)	(-0.575)	(0.210)	(-7.063)	(1.022)	(0.915)
Industry dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	0.00172	-0.0161**	-0.000859	-0.0217***	0.0731***	-0.0170	-0.0386**
	(0.384)	(-2.344)	(-0.107)	(-3.342)	(10.60)	(-1.369)	(-2.363)
Observations	2603	2603	2603	2603	2603	2603	2603
R-squared	0.159	0.181	0.056	0.052	0.105	0.068	0.082

(Robust t-statistics) in parentheses
*** p<0.01; ** p<0.05; * p<0.1

The table illustrates results from estimates of the following model: $(C)AR_i = Const_i + \sum_{i=1}^{7} \beta_{1,i} Netstr_i + \beta_2 Domini_i + \beta_3 Logemployee_i + \sum_{j=1}^{10} \beta_{4,j} Industries_j + \epsilon_i$ where abnormal returns and cumulative abnormal returns of various length are the dependent variables in different columns. $\mathbf{Netstr}_i$ represents for each CSR domain the sum of strengths minus the sum of concerns according to RiskMetrics-KLD rating, where i stands for community, corporate governance, diversity, employee, environment, human rights and product quality. **Domini** is a dummy variable taking value 1 if the company belongs only to FTSE KLD 400 or to both FTSE KLD 400 and $S\&P500$ and 0 otherwise. **Logemployee** is the natural log of the number of employees in the firm. **Industry** is the j-th industry dummy which takes value 1 if the company belongs to the j-th industry according to the Industry Classification Benchmark (ICB) and 0 otherwise. The regression is estimated with OLS and White heteroskedasticity robust standard errors. Abnormal returns are calculated as $AR_i = R_i - E[R_i|X]$, where $E[R_i|X]$ is estimated using the market model $R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau}$ with a 6-month estimation window and $CAR_i(0;+1) = AR_i(0) + AR_i(1)$.

Table 11: **The asymmetric effect of strengths and concerns in each specific CSR domain**

VARIABLES	(1) AR(-1)	(2) AR(0)	(3) AR(+1)	(4) AR(+2)	(5) AR(+3)	(6) CAR(0;+1)	(7) CAR(0;+2)	(8) AR(-1)	(9) AR(0)	(10) AR(+1)	(11) AR(+2)	(12) AR(+3)	(13) CAR(0;+1)	(14) CAR(0;+2)
Comstr	0.00351**	0.00319	0.00868***	0.00127	0.0120***	0.0119***	0.0131**	0.00158	0.00495*	0.00543**	0.00131	0.00604**	0.0104***	0.0117**
	(2.058)	(1.248)	(3.689)	(0.583)	(3.932)	(3.075)	(2.457)	(0.924)	(1.907)	(2.297)	(0.570)	(1.976)	(2.586)	(2.106)
Cgovstr	-0.00152	0.00776***	0.00370	0.00182	0.00542*	0.0115***	0.0133**	-0.000243	0.00535**	0.00370	0.000288	0.00344	0.00905**	0.00934*
	(-0.905)	(2.698)	(1.598)	(0.753)	(1.833)	(2.760)	(2.362)	(-0.148)	(1.987)	(1.602)	(0.122)	(1.178)	(2.232)	(1.706)
Divstr	-0.00243***	0.000640	-0.00278***	0.000876	-0.000597	-0.00214	-0.00127	-0.000589	-0.00152	-0.00151	0.000136	-0.000182	-0.00303	-0.00289
	(-2.675)	(0.490)	(-2.661)	(0.742)	(-0.429)	(-1.112)	(-0.518)	(-0.666)	(-1.235)	(-1.449)	(0.119)	(-0.133)	(-1.634)	(-1.230)
Empstr	0.00325***	-0.00127	0.00221	-0.00005	-0.00607***	0.000940	0.000884	0.00163	0.00156	0.00143	0.00130	-0.00539***	0.00299	0.00429
	(2.634)	(-0.759)	(1.511)	(-0.0358)	(-3.213)	(0.409)	(0.293)	(1.328)	(1.035)	(0.992)	(0.861)	(-2.932)	(1.322)	(1.465)
Envstr	-0.000740	-0.000782	-0.00376	-0.000882	-0.00438*	-0.00454	-0.00542	-0.000969	-0.00101	-0.00303	-0.000747	-0.000926	-0.00404	-0.00478
	(-0.522)	(-0.368)	(-1.435)	(-0.467)	(-1.912)	(-1.209)	(-1.230)	(-0.774)	(-0.537)	(-1.222)	(-0.395)	(-0.411)	(-1.131)	(-1.132)
Humstr	0.00617	0.00006	-0.0121	0.0139	-0.0159*	-0.0120	0.00191	0.00688	-0.00201	-0.00926	0.00998	-0.0132	-0.0113	-0.00128
	(0.919)	(0.00930)	(-1.124)	(1.472)	(-1.794)	(-0.954)	(0.101)	(1.076)	(-0.352)	(-0.935)	(1.034)	(-1.635)	(-0.926)	(-0.0715)
Prostr	-0.00452	-0.00212	-0.00137	0.00563*	0.0127**	-0.00350	0.00213	-0.00348	-0.00384	-0.00128	0.00497	0.0161***	-0.00512	-0.000156
	(-1.126)	(-0.486)	(-0.375)	(1.653)	(2.145)	(-0.569)	(0.318)	(-0.895)	(-1.008)	(-0.352)	(1.445)	(2.857)	(-0.861)	(-0.0243)
Comcon	0.00420*	-0.00597	0.00351	0.00289	0.00924*	-0.00247	0.000423	0.000877	-0.00224	0.00008	0.00344	0.00210	-0.00216	0.00129
	(1.790)	(-1.408)	(1.003)	(0.863)	(1.909)	(-0.384)	(0.0540)	(0.386)	(-0.579)	(0.0243)	(1.064)	(0.452)	(-0.353)	(0.174)
Cgovcon	-0.00378**	-0.00443	-0.00347**	-0.00216	-0.00007	-0.00789**	-0.0100**	-0.00308*	-0.00494*	-0.00305*	-0.00290	0.00159	-0.00799**	-0.0109**
	(-2.229)	(-1.631)	(-2.005)	(-0.929)	(-0.0288)	(-2.092)	(-1.963)	(-1.852)	(-1.852)	(-1.741)	(-1.238)	(0.575)	(-2.083)	(-2.106)
Divcon	0.000960	-0.00601***	-0.00189	0.000137	-0.00178	-0.00789***	-0.00776**	-0.000177	-0.00335*	-0.00126	-0.000489	0.00106	-0.00461	-0.00510
	(0.665)	(-2.891)	(-1.005)	(0.0722)	(-0.727)	(-2.618)	(-2.002)	(-0.133)	(-1.701)	(-0.675)	(-0.261)	(0.427)	(-1.547)	(-1.349)
Empcon	-0.000368	-0.000359	-0.00262*	0.000630	-0.00451**	-0.00298	-0.00235	0.000171	-0.000827	-0.00149	0.000544	-0.00357*	-0.00231	-0.00177
	(-0.297)	(-0.235)	(-1.779)	(0.457)	(-2.319)	(-1.299)	(-0.788)	(0.136)	(-0.578)	(-1.010)	(0.399)	(-1.885)	(-1.019)	(-0.602)
Envcon	0.0121***	-0.0116***	0.000339	-0.00417**	0.00115	-0.0113***	-0.0154***	0.00543***	-0.00117	-0.00184	0.00120	0.00107	-0.00301	-0.00181
	(8.086)	(-5.562)	(0.246)	(-2.389)	(0.605)	(-4.147)	(-4.289)	(3.719)	(-0.585)	(-1.098)	(0.673)	(0.540)	(-1.030)	(-0.480)
Humcon	-0.00731	-0.000260	0.00508	0.00155	-0.00448	0.00482	0.00637	-0.00851	0.00243	0.00491	-0.000281	-0.00421	0.00734	0.00706
	(-1.234)	(-0.0671)	(1.580)	(0.436)	(-1.208)	(0.905)	(0.848)	(-1.421)	(0.718)	(1.532)	(-0.0816)	(-1.147)	(1.417)	(0.997)
Procon	-0.00241	-0.00432	-0.00407**	-0.00801***	0.00253	-0.00839**	-0.0164***	-0.00168	-0.00564**	-0.00528***	-0.00597***	-0.000362	-0.0109***	-0.0169***
	(-1.488)	(-1.462)	(-2.389)	(-3.726)	(1.165)	(-2.055)	(-2.870)	(-1.076)	(-1.974)	(-2.950)	(-2.796)	(-0.167)	(-2.682)	(-2.981)
Logemployee	-0.000614	0.00436***	-0.00182**	0.00130**	-0.00832***	0.00254**	0.00384***	0.000791	0.00213***	0.00003	-0.00004	-0.00624***	0.00216*	0.00212
	(-1.060)	(6.101)	(-2.554)	(1.971)	(-9.389)	(2.307)	(2.899)	(1.483)	(2.868)	(0.0443)	(-0.0590)	(-6.904)	(1.819)	(1.467)
Industry dummies	NO	NO	NO	NO	NO	NO	NO	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	0.00546	-0.0193***	0.0195***	-0.00353	0.0808***	0.000220	-0.00331	0.000721	-0.0165**	-0.000469	-0.0213***	0.0753***	-0.0169	-0.0382**
	(1.257)	(-3.624)	(3.913)	(-0.705)	(12.54)	(0.0281)	(-0.340)	(0.158)	(-2.471)	(-0.0570)	(-3.319)	(10.69)	(-1.362)	(-2.351)
Observations	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603	2603
R-squared	0.062	0.051	0.029	0.013	0.073	0.033	0.034	0.163	0.184	0.059	0.054	0.112	0.073	0.086

(Robust t-statistics) in parentheses
*** p<0.01; ** p<0.05; * p<0.1

The table illustrates results from estimates of the following model: $(C)AR_i = Const_i + \sum_{str=1}^{7} \beta_{1,str} Strengths_{str} + \sum_{con=1}^{7} \beta_{2,con} Concerns_{con} + \beta_3 logemployee_i + \sum_{ind=1}^{10} \beta_{4,j} Industries_j + \epsilon_i$ where abnormal returns and cumulative abnormal returns of various length are the dependent variables in different columns. **strengths** represent the sum of any sub-strength for each company i in the sample according to RiskMetrics-KLD ratings where str stands for community, corporate governance, diversity, employee relations, environment, human rights and product quality. **concerns** represent the sum of any sub-concern for each company i in the sample according to Riskmetrics-KLD ratings where con stands for community, corporate governance, diversity, employee relations, environment, human rights and product quality. **logemployee** is the natural log of the number of employees in the firm. **Industry** is the j-th industry dummy which takes value 1 if the company belongs to the j-th industry according to the Industry Classification Benchmark (ICB) and 0 otherwise. The regression is estimated with OLS and White heteroskedasticity robust standard errors. Abnormal returns are calculated as $AR_i = R_i - E[R_i|X]$, where $E[R_i|X]$ is estimated using the market model $R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \epsilon_{i\tau}$ with a 6-month estimation window and $CAR_i(0;+1) = AR_i(0) + AR_i(1)$.

Appendix A

Criteria of KLD social ratings

SOCIAL ISSUE RATINGS [1]

COMMUNITY STRENGTHS:

Charitable Giving (COM-str-A). The company has consistently given over 1.5% of trailing three-year net earnings before taxes (NEBT) to charity, or has otherwise been notably generous in its giving [In 2002, KLD renamed the Generous Giving Strength as Charitable Giving]. **Innovative Giving** (COM-str-B). The company has a notably innovative giving program that supports nonprofit organizations, particularly those promoting self-sufficiency among the economically disadvantaged. Companies that permit nontraditional federated charitable giving drives in the workplace are often noted in this section as well. **Support for Housing** (COM-str-C). The company is a prominent participant in public/private partnerships that support housing initiatives for the economically disadvantaged, e.g., the National Equity Fund or the Enterprise Foundation. **Support for Education** (COM-str-D).The company has either been notably innovative in its support for primary or secondary school education, particularly for those programs that benefit the economically disadvantaged, or the company has prominently supported job-training programs for youth.**Indigenous People Relations** (COM-str-E). The company has established relations with indigenous people in the areas of its proposed or current operations that respect the sovereignty, land, culture, human rights, and intellectual property of the indigenous people [added in 2000; in 2002 moved into the Human Rights area].**Non-US Charitable Giving** (COM-str-F). The company has made a substantial effort to make charitable contributions abroad, as well as in the U.S. To qualify, a company must make at least 20% of its giving, or have taken notably innovative initiatives in its giving program, outside the U.S. **Volunteer Programs** (COM-str-G).The company has an exceptionally strong volunteer program [added in 2005]. **Other Strength**(COM-str-X). The company has either an exceptionally strong in-kind giving program, or engages in other notably positive community activities.

COMMUNITY CONCERNS:

Investment Controversies (COM-con-A). The company is a financial institution whose lending or investment practices have led to controversies, particularly ones related to the Community Reinvestment Act. **Negative Economic Impact** (COM-con-B). The company's actions have resulted in major controversies concerning its economic impact on the community. These controversies can include issues related to environmental contamination, water rights disputes, plant closings, "put-or-pay" contracts with trash

[1] Own elaboration of definitions and groups are updated to the last KLD release.

incinerators, or other company actions that adversely affect the quality of life, tax base, or property values in the community. **Indigenous People Relations** (COM-con-C). The company has been involved in serious controversies with indigenous people that indicate the company has not respected the sovereignty, land, culture, human rights, and intellectual property of the indigenous people [added in 2000; in 2002 moved into the Human Rights area]. **Disputes** (COM-con-D). The company has recently been involved in major tax disputes involving Federal, state, local or non-U.S. government authorities, or is involved in controversies over its tax obligations to the community [entered in 1991; in 2005 moved into the Community area].**Other Concern** (COM-con-X). The company is involved with a controversy that has mobilized community opposition, or is engaged in other noteworthy community controversies.

CORPORATE GOVERNANCE STRENGTHS:

Limited Compensation(CGOV-str-A). The company has recently awarded notably low levels of compensation to its top management or its board members. The limit for a rating is total compensation of less than $\$500,000$ per year for a CEO or $\$30,000$ per year for outside directors. **Ownership Strength**(CGOV-str-C). The company owns between 20% and 50% of another company KLD has cited as having an area of social strength, or is more than 20% owned by a firm that KLD has rated as having social strengths. When a company owns more than 50% of another firm, it has a controlling interest, and KLD treats the second firm as if it is a division of the first. **Transparency Strength**(CGOV-str-D). The company is particularly effective in reporting on a wide range of social and environmental performance measures, or is exceptional in reporting on one particular measure [added in 2006; this strength incorporates information from the former Environment: Communications Strength (ENV-str-E) as part of its content.].**Accountability Strength** (CGOV-str-E). The company has shown markedly responsible leadership on public policy issues and/or has an exceptional record of transparency and accountability concerning its political involvement in state or federal-level U.S. politics, or in non-U.S. politics [added in 2006]. **Other Strength**(CGOV-str-X). The company has an innovative compensation plan for its board or executives, a unique and positive corporate culture, or some other initiative not covered by other KLD ratings.

CORPORATE GOVERNANCE CONCERNS:

High Compensation (CGOV-con-B). The company has recently awarded notably high levels of compensation to its top management or its board members. The limit for a rating is total compensation of more than $\$10 million$ per year for a CEO or $\$100,000$ per year for outside directors. **Ownership Concern** (CGOV-con-F). The company owns between 20% and 50% of a company KLD has cited as having an area of social concern, or is more than 20% owned by a firm KLD has rated as having areas of concern. When a

company owns more than 50% of another firm, it has a controlling interest, and KLD treats the second firm as if it is a division of the first. **Accounting Concern** (CGOV-con-G). The company is involved in significant accounting related controversies [added in 2006]. **Transparency Concern** (CGOV-con-H). The company is distinctly weak in reporting on a wide range of social and environmental performance measures [added in 2006]. **Political Accountability Concern** (CGOV-con-I). The company has been involved in noteworthy controversies on public policy issues and/or has a very poor record of transparency and accountability concerning its political involvement in state or federal level U.S. politics, or in non-U.S. politics [added in 2006].**Other Concern** (CGOV-con-X). The company restated its earnings over an accounting controversy, has other accounting problems, or is involved with some other controversy not covered by other KLD ratings.

DIVERSITY STRENGTHS:

CEO (DIV-str-A). The company's chief executive officer is a woman or a member of a minority group. **Promotion** (DIV-str-B). The company has made notable progress in the promotion of women and minorities, particularly to line positions with profit-and-loss responsibilities in the corporation. **Board of Directors** (DIV-str-C). Women, minorities, and/or the disabled hold four seats or more (with no double counting) on the board of directors, or one-third or more of the board seats if the board numbers less than 12. **Work/Life Benefits** (DIV-str-D). The company has outstanding employee benefits or other programs addressing work/life concerns, e.g., child care, elder care, or flextime [entered in 1991 with the name Family Benefits Strength, it was renamed in 2005]. **Women & Minority Contracting** (DIV-str-E). The company does at least 5% of its subcontracting, or otherwise has a demonstrably strong record on purchasing or contracting, with women- and/or minority-owned businesses. **Employment of the Disabled** (DIV-str-F). The company has implemented innovative hiring programs, other innovative human resource programs for the disabled, or otherwise has a superior reputation as an employer of the disabled. **Gay & Lesbian Policies** (DIV-str-G). The company has implemented notably progressive policies toward its gay and lesbian employees. In particular, it provides benefits to the domestic partners of its employees [entered in 1991 with the name Progressive Gay/Lesbian Policies strength, it was renamed in 1995]. **Other Strength** (DIV-str-X). The company has made a notable commitment to diversity that is not covered by other KLD ratings.

DIVERSITY CONCERNS:

Controversies (DIV-con-A). The company has either paid substantial fines or civil penalties as a result of affirmative action controversies, or has otherwise been involved in major controversies related to affirmative action issues. **Non-Representation** (DIV-con-B). The company has no women on its board of directors or among its senior line managers. **Other Con-**

cern (DIV-con-X). The company is involved in diversity controversies not covered by other KLD ratings.

EMPLOYEE RELATIONS STRENGTHS:
Union Relations (EMP-str-A). The company has taken exceptional steps to treat its unionized workforce fairly [entered in 1991 it was renamed from Strong Union Relations]. **No-Layoff Policy** (EMP-str-B). The company has maintained a consistent no-layoff policy [added in 1994]. **Cash Profit Sharing** (EMP-str-C). The company has a cash profit-sharing program through which it has recently made distributions to a majority of its workforce. **Employee Involvement** (EMP-str-D). The company strongly encourages worker involvement and/or ownership through stock options available to a majority of its employees, gain sharing, stock ownership, sharing of financial information, or participation in management decision-making. **Retirement Benefits Strength** (EMP-str-F). The company has a notably strong retirement benefits program. KLD renamed this strength from Strong Retirement Benefits. **Health and Safety Strength** (EMP-str-G). The company is noted by the US Occupational Health and Safety Administration for its safety programs. **Other Strength** (EMP-str-X).The company has strong employee relations initiatives not covered by other KLD ratings.

EMPLOYEE RELATIONS CONCERNS:
Union Relations (EMP-con-A). The company has a history of notably Poor Union Relations. **Health and Safety Concern** (EMP-con-B). The company recently has either paid substantial fines or civil penalties for willful violations of employee health and safety standards, or has been otherwise involved in major health and safety controversies. **Workforce Reductions** (EMP-con-C). The company has reduced its workforce by 15% in the most recent year or by 25% during the past two years, or it has announced plans for such reductions. **Retirement Benefits Concern** (EMP-con-D). The company has either a substantially underfunded defined benefit pension plan, or an inadequate retirement benefits program [entered in 1991 with the name Pension/Benefits Concern, it was renamed in 2004]. Other Concern. The company is involved in an employee relations controversy that is not covered by other KLD ratings.

ENVIRONMENTAL STRENGTHS:
Beneficial Products and Services(ENV-str-A). The company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits. (The term "environmental service" does not include services with questionable environmental effects, such as landfills, incinerators, waste-to-energy plants, and deep injection wells). **Pollution Prevention** (ENV-str-B). The company

has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs. **Recycling** (ENV-str-C). The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry. **Clean Energy**(ENV-str-D). The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency. The company has demonstrated a commitment to promoting climate-friendly policies and practices outside its own operations [entered in 1991 it was renamed from Alternative Fuel Strength]. **Communications** (ENV-str-E). The company is a signatory to the CERES Principles, publishes a notably substantive environmental report, or has notably effective internal communications systems in place for environmental best practices.[added in 1996; it was incorporated with the Corporate Governance: Transparency rating (CGOV-str-D), which was added in 2005]. **Property, Plant, and Equipment** (ENV-str-F). The company maintains its property, plant, and equipment with above average environmental performance for its industry. [added in 1995]. **Management Systems** (ENV-str-G). The company has demonstrated a superior commitment to management systems through ISO 14001 certification and other voluntary programs [added in 2006]. **Other Strength** (ENV-str-X). The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

ENVIRONMENTAL CONCERNS:

Hazardous Waste (ENV-con-A). The company's liabilities for hazardous waste sites exceed $\$50 million$, or the company has recently paid substantial fines or civil penalties for waste management violations. **Regulatory Problems**. (ENV-con-B) The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations. **Ozone Depleting Chemicals**. (ENV-con-C). The company is among the top manufacturers of ozone depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines. **Substantial Emissions**. (ENV-con-D). The company's legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD. **Agricultural Chemicals**. (ENV-con-E). The company is a substantial producer of agricultural chemicals, i.e., pesticides or chemical fertilizers. **Climate Change**. (ENV-con-F). The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies. **Other Concern**. (ENV-con-X). The company

has been involved in an environmental controversy that is not covered by other KLD ratings.

HUMAN RIGHTS STRENGTHS:
Positive Record in South Africa (HUM-str-A). The company's social record in South Africa is noteworthy [existed only in 1994 and 1995]. **Indigenous Peoples Relations Strength**. (HUM-str-D). See Community Indigenous Peoples Relations (COM-str-E) [added in 2000 under Community, from 2004 moved in Human Rights]. **Labor Rights Strength** (HUM-str-G). The company has outstanding transparency on overseas sourcing disclosure and monitoring, or has particularly good union relations outside the U.S., or has undertaken labor rights-related initiatives that KLD considers outstanding or innovative [added in 2002]. **Other Strength**.(HUM-str-X) The company has undertaken exceptional human rights initiatives, including outstanding transparency or disclosure on human rights issues, or has otherwise shown industry leadership on human rights issues not covered by other KLD human rights ratings [entered in 1994].

HUMAN RIGHTS CONCERNS:
South Africa (HUM-con-A). The company faced controversies over its operations in South Africa [existed from 1991 to 1994]. **Northern Ireland** (HUM-con-B). The company has operations in Northern Ireland [existed from 1991 to 1994]. **Burma Concern**(HUM-con-C). The company has operations or direct investment in, or sourcing from, Burma. [added in 1995]. **Mexico** (HUM-con-D). The company's operations in Mexico have had major recent controversies, especially those related to the treatment of employees or degradation of the environment [existed from 1995 to 2002]. **Labor Rights Concern** (HUM-con-F). The company's operations have had major recent controversies primarily related to labor standards in its supply chain [added in 1998; it was lately renamed from the International Labor Concern]. **Indigenous Peoples Relations Concern** (HUM-con-G). The company has been involved in serious controversies with indigenous peoples (either in or outside the U.S.) that indicate the company has not respected the sovereignty, land, culture, human rights, and intellectual property of indigenous peoples [added in 2000]. **Other Concern** (HUM-con-X). The company's operations have been the subject of major recent human rights controversies not covered by other KLD ratings.

PRODUCT STRENGTHS:
Quality (PRO-str-A). The company has a long-term, well-developed, company-wide quality program, or it has a quality program recognized as exceptional in U.S. industry. **R&D/Innovation** (PRO-str-B). The company is a leader in its industry for research and development (R&D), particularly by bringing notably innovative products to market. **Benefits to Economically Disadvantaged** (PRO-str-C). The company has as part of its basic mis-

sion the provision of products or services for the economically disadvantaged. **Other Strength** (PRO-str-X). The company's products have notable social benefits that are highly unusual or unique for its industry.

PRODUCT CONCERNS:
Product Safety (PRO-con-A). The company has recently paid substantial fines or civil penalties, or is involved in major recent controversies or regulatory actions, relating to the safety of its products and services. **Marketing/Contracting Concern** (PRO-con-D). The company has recently been involved in major marketing or contracting controversies, or has paid substantial fines or civil penalties relating to advertising practices, consumer fraud, or government contracting. (Formerly: Marketing/Contracting Controversy). **Antitrust** (PRO-con-E). The company has recently paid substantial fines or civil penalties for antitrust violations such as price fixing, collusion, or predatory pricing, or is involved in recent major controversies or regulatory actions relating to antitrust allegations. **Other Concern** (PRO-con-X). The company has major controversies with its franchises, is an electric utility with nuclear safety problems, defective product issues, or is involved in other product related controversies not covered by other KLD ratings.

ALCOHOL (ALC-con-A) : **Licensing**. The company licenses its company or brand name to alcohol products. **Manufacturers**. Companies that are involved in the manufacture alcoholic beverages including beer, distilled spirits, or wine. **Manufacturers of Products Necessary for Production of Alcoholic Beverages**. Companies that derive 15% or more of total revenues from the supply of raw materials and other products necessary for the production of alcoholic beverages. **Retailers**. Companies that derive 15% or more of total revenues from the distribution (wholesale or retail) of alcoholic beverages. **Ownership by an Alcohol Company**. The company is more than 50% owned by a company with alcohol involvement. **Ownership of an Alcohol Company**. The company owns more than 20% of another company with alcohol involvement. (When a company owns more than 50% of company with alcohol involvement, KLD treats the alcohol company as a consolidated subsidiary.) **(ALC-con-X)**: **Alcohol Other Concern**. The company derives substantial revenues from the activities closely associated with the production of alcoholic beverages [KLD assigned concerns in this category through 2002].

GAMBLING (GAM-con-A): **Licensing**. The company licenses its company or brand name to gambling products. **Manufacturers**. Companies that produce goods used exclusively for gambling, such as slot machines, roulette wheels, or lottery terminals. **Owners and Operators**. Companies that own and/or operate casinos, racetracks, bingo parlors, or other betting establishments, including casinos; horse, dog, or other race tracks that per-

mit wagering; lottery operations; on-line gambling; pari-mutuel wagering facilities; bingo; Jai-alai; and other sporting events that permit wagering. **Supporting Products or Services**. Companies that provide services in casinos that are fundamental to gambling operations, such as credit lines, consulting services, or gambling technology and technology support. **Ownership by a Gambling Company**. The company is more than 50% owned by a company with gambling involvement. **Ownership of a Gambling Company**. The company owns more than 20% of another company with gambling involvement. (When a company owns more than 50% of company with gambling involvement, KLD treats the gambling company as a consolidated subsidiary.) **(GAM-con-X)**: Gambling Other Concern The company derives substantial revenues from the activities closely associated with the production of goods and services closely related to the gambling industry or lottery industries [KLD assigned concerns in this category through 2002].

TOBACCO (TOB-con-A): **Licensing** The company licenses its company name or brand name to tobacco products. **Manufacturers**. The company produces tobacco products, including cigarettes, cigars, pipe tobacco, and smokeless tobacco products. **Manufacturers of Products Necessary for Production of Tobacco Products**. The company derives 15% or more of total revenues from the production and supply of raw materials and other products necessary for the production of tobacco products. **Retailers**. The company derives 15% or more of total revenues from the distribution (wholesale or retail) of tobacco products. **Ownership by a Tobacco Company**. The company is more than 50% owned by a company with tobacco involvement. **Ownership of a Tobacco Company**. The company owns more than 20% of another company with tobacco involvement. (When a company owns more than 50% of company with tobacco involvement, KLD treats the tobacco company as a consolidated subsidiary). **(TOB-con-X)**: **Tobacco Other Concern** The company derives substantial revenues from the production of tobacco products [added in 2002].

FIREARMS (FIR-con-A): **Manufacturers**. The company is engaged in the production of small arms ammunition or firearms, including, pistols, revolvers, rifles, shotguns, or sub-machine guns. **Retailers**. The company derives 15% or more of total revenues from the distribution (wholesale or retail) of firearms and small arms ammunition. **Ownership by a Firearms Company**. The company is more than 50% owned by a company with firearms involvement. **Ownership of a Firearms Company**. The company owns more than 20% of another company with firearms involvement. (When a company owns more than 50% of company with firearms involvement, KLD treats the firearms company as a consolidated subsidiary) [added in 1999].

MILITARY (MIL-con-A): Manufacturers of Weapons or Weapons Systems. Companies that derive more than 2% of revenues from the sale of conventional weapons or weapons systems, or earned 50 million or more from the sale of conventional weapons or weapons systems, or earned 10 million or more from the sale of nuclear weapons or weapons systems. **Manufacturers of Components for Weapons or Weapons Systems**. Companies that derive more than 2% of revenues from the sale of customized components for conventional weapons or weapons systems, or earned 50 million or more from the sale of customized components for conventional weapons or weapons systems, or earned 10 million or more from the sale of customized components for nuclear weapons or weapons systems. **Ownership by a Military Company**. The company is more than 50% owned by a company with military involvement. **Ownership of a Military Company**. The company owns more than 20% of another company with military involvement. (When a company owns more than 50% of company with military involvement, KLD treats the military company as a consolidated subsidiary) [entered since 1991]. **(MIL-con-B): Minor Weapons Contracting Involvement**. The company has minor involvement in weapons-related contracting. In the most recent fiscal year for which information is available, it derived 10 to 50 million in conventional weapons-related prime contracts (when that figure is less that 2% of revenue), or 1 to 10 million from nuclear weapons-related prime contracts [existed just from 1991 to 2002]. **(MIL-con-C): Major Weapons-related Supplier**. During the last fiscal year, the company received from the Department of Defense more than 50 million for fuel or other supplies related to weapons [existed just from 1991 to 2002]. **(MIL-con-X): Military Other Concern**. The company has substantial involvement in weapons-related contracting. In the most recent fiscal year for which information is available, it derived more than 2% of sales or 50 million from weapons-related contracting, or it received more than 10 million in nuclear weapons-related prime contracts [existed just through 2002].

NUCLEAR POWER (NUC-con-A): Construction & Design of Nuclear Power Plants. The company designs, engineers, and constructs nuclear power plants and nuclear reactors for use in nuclear power plants; including companies that design nuclear reactors and engineer and/or construct nuclear power plants. **Nuclear Power Fuel and Key Parts**. The company supplies nuclear fuel material and key parts used in nuclear plants and reactors. Fuel includes mining of uranium and conversion, enrichment, and fabrication of uranium. Key parts include manufacture or sale of specialized parts for use in nuclear power plants including but not exclusive to steam generators, control rod drive mechanisms, reactor vessels, cooling systems, containment structures, fuel assemblies, and digital instrumentation & controls. **Nuclear Power Service Provider**. The company is involved

in the transport of nuclear power materials and nuclear plant maintenance. **Ownership of Nuclear Power Plants**. The company has an ownership interest or operates nuclear power plant(s). Does not include publicly traded companies that are an owner or operator of a nuclear plant that has shut down and is being decommissioned. **Ownership by a Nuclear Power Company**. The company is more than 50% owned by a company with nuclear power involvement. **Ownership of a Nuclear Power Company**. The company owns more than 20% of another company with nuclear power involvement. If company ownership of company with nuclear power involvement is greater than 50%, KLD treats subsidiary as a consolidated subsidiary. **(NUC-con-C)**: **Design**. The company derives identifiable revenues from the design of nuclear power plants. This category does not include companies providing construction or maintenance services for nuclear power plants [existed just through 2002; it was re-instated as Construction & Design of Nuclear Power Plants under the code NUC-con-A in 2005]. **(NUC-con-D)**: **Fuel Cycle/Key Parts**. The company mines, processes, or enriches uranium, or is otherwise involved in the nuclear fuel cycle. Or, the company derives substantial revenues from the sale of key parts or equipment for generating power through using nuclear fuels. [existed just through 2002; it was re-instated as Nuclear Power Fuel and Key Parts under the code NUCcon- A]. **(NUC-con-X)**: **Nuclear Power Other Concern**. The company is involved in the production of Nuclear Power[existed just through 2002].

Appendix B

FTSE KLD 400 Social Index Methodology

Domini Research & Analytics, Inc. (KLD) was acquired by RiskMetrics Group in 2009 (hereby RiskMetrics-KLD). KLD was an independent investment research and index company founded in 1988. KLD provided research, indexes, consulting and compliance services to institutions for integration of environmental, social and governance (ESG) factor into their investment strategies.

RiskMetrics-KLD researches the social, environmental, and governance performance of corporations (ESG) and its research relies on four distinct data sources. Data are collected in a disciplined process from a wide variety of companies, government, non-government organization and media sources. RiskMetrics-KLD tracks each company through more than 14000 global media sources daily. RiskMetrics-KLD uses three processes to maintain the accuracy and currency of its research:

- Continuous updates: daily updates from media sources and special updates from NGOs and government data sources
- Fiscal year updates: annual updates from company public documents
- Annual updates: a comprehensive annual review that includes analysis of all information gathered throughout the year, review of company websites and CSR reports, and direct communication with the company, NGOs, and research partners.

RiskMetrics-KLD's products and services help institutional investors and money managers meet their fiduciary responsibilities. RiskMetrics-KLD indexes are accepted as the benchmark for investment strategies and they are designed to be transparent, representative and investable.

The FTSE KLD 400 Social Index is now a float-adjusted, market capitalization-weighted, common stock index of US equities. Launched by KLD in May 1990, the FTSE KLD 400 Social Index (formerly Domini 400 Social Index, DSI 400) was the first benchmark index constructed using environmental, social and governance (ESG) factors. The DSI 400 was renamed the FTSE KLD 400 Social Index in July 2009. By combining RiskMetrics-KLD's research leadership with FTSE's indexing expertise, the new series provides a cutting-edge range of index solutions across a variety of ESG themes in fact it is a widely recognized benchmark for measuring the impact of social and environmental screening on investment portfolios. The index holds companies that have positive environmental, social and governance performance relative to their industry and sector peers, and in relation to the broader market.

The FTSE KLD 400 Social Index consists of approximately 250 companies included in the Standard & Poor's 500 Index, approximately 100 additional large companies not included in the S&P 500 but providing industry representation, and approximately 50 additional companies with particularly strong social characteristics. The eligible universe is the 3000 largest U.S. Equity; RiskMetrics-KLD uses a two-step screening process for selecting companies for the FTSE KLD 400 Social Index; first excludes from consideration companies involved in Controversial Business; second RiskMetrics-KLD selects companies that have positive ESG records and evaluates companies in the context of their industry, sector, market capitalization and S&P 500 status.

Companies are selected as potential candidates for the DS400 based on an assessment of the current index composition and anticipated future changes to the index. RiskMetrics-KLD ensures that there are sufficient approved candidates to meet the various need of the index at any point of time. RiskMetrics-KLD selects candidates from the universe of financially qualified companies that meet one or more of the following criteria:

- ESG performance
- Sector and industry representation
- Market capitalization
- S&P 500 status

The FTSE KLD 400 Social Index is maintained at 400 constituents at all times. An index addition is made only if a vacancy is created by an index removal and addition are selected from a list of approved companies. Furthermore RiskMetrics-KLD seeks to maintain the composition of Index holdings at approximately 90% large cap companies, 9% mid cap companies, chosen for sector diversification, and 1% small cap companies with exemplary social and environmental records.

Once a company has been selected as a FTSE KLD 400 Social Index potential, it undergoes a rigorous evaluation by the sector analyst. He completes a comprehensive evaluation from their recommendation detailing why the company should or should not be added to the Index. Companies that have positive social and environmental records are evaluated on the following issues: community relations, diversity, employee relations, human rights, product quality and safety, and environment and corporate governance. The companies are analyzed in the context of their industry and sector as well as in relation to the broader market.

Companies that are identified as having deteriorating a ESG performance in one or more of the qualitative issue areas may be added to the FTSE KLD 400 Social Index watch list. The FTSE KLD 400 Social Index Committee will monitor the company's progress and continue to engage the company,

until it decides to remove the company from the watch list or remove the company from the index. The FTSE KLD 400 Social Index Committee may remove companies from the index at any time due to the corporate actions, concerns about financial quality, failure of ESG screens, deteriorating ESG performance or lack of social representation.

Appendix C

Industry Classification Benchmark (ICB) Classification

INDUSTRY	SUPERSECTOR	SECTOR	SUBSECTOR
CONSUMER GOODS	Automobiles & Parts	Automobiles & Parts	Automobiles
			Auto Parts
			Tires
	Food & Beverage	Beverage	Brewers
			Distillers and Vintners
			Soft Drinks
		Food Producers	Farming & Fishing
			Food Products
	Personal & Household Goods	Household Goods	Durable Household Products
			Non Durable Household Products
			Furnishing
			Home Construction
		Leisure Goods	Consumer Electronics
			Recreational Products
			Toys
		Personal Goods	Clothing & Accessorize
			Footwear
			Personal Products
		Tobacco	Tobacco
CONSUMER SERVICES	Retail	Food & Drug Retailers	Drug Retailers
			Food Retailers & wholesalers
		General Retailers	Apparel Retailer
			Broadline Retailers
			Home Improvement Retailers
			Specialized Consumer Services
			Specialty Retailers
	Media	Media	Broadcasting & Entertainment
			Media Agencies
			Publishing
	Travel & Leisure	Travel & Leisure	Airlines
			Gambling
			Hotels
			Recreational Services
			Restaurants & Bars
			Travel & Tourism
BASIC MATERIALS	Chemicals	Chemicals	Commodity Chemicals
			Specialty Chemicals
	Basic Resource	Forestry & Paper	Forestry
			Paper
		Industrials Metals	Aluminium
			Nonferrrous Metals
			Steel
		Mining	Coal
HEALTHCARE	Healthcare	Healthcare Equipement & Services	Healthcare Providers
			Medical Equipment
			Medical Supplies
		Pharmaceuticals & Biotechnology	Biotechnology
			Pharmaceuticals
TELECOMMUNICATIONS	Telecommunications	Fixed Line Telecommunications	Telecommunication Equipment
			Fixed Line Telecommunications
		Mobile Telecommunications	Mobile Telecommunications

	Banks	Banks	Banks
	Insurance	Nonlife Insurance	Full Line Insurance
			Insurance Brokers
			Property and Casualty insurance
			Reinsurance
		Life Insurance	Life Insurance
FINANCIALS	Financial Services	Real Estate	Real Estate Holding & Development
			Real Estate Investment Trusts
		General Financial	Asset Managers
			Consumer Finance
			Specialty Finance
			Investment Services
			Mortgage Finance
		Equity Investment Instruments	Equity Investment Instruments
		Nonequity Investment Instruments	Nonequity Investment Instruments
	Construction & Materials	Construction & Materials	Building Materials & Fixtures
			Heavy Construction
	Industrial Goods & Services	Aerospace & Defense	Aerospace
			Defense
		General Industrials	Containers & Packaging
			Diversified Industrials
		Electronic and Electrical Equipment	Electrical Components & Equipment
			Electronic Equipment
		Industrial Engineering	Commercial Vehicles and Trucks
			Industrial Machinery
INDUSTRIALS		Industrial Transportation	Delivery services
			Marine Transportation
			Railroads
			Transportation Services
			Trucking
		Support Services	Business Support Services
			Business Training & Employment Agencies
			Financial Administration
			Industrial Suppliers
			Waste & Disposal Services
OIL & GAS	Oil & Gas	Oil & Gas Producers	Exploration & Production
			Integrated Oil & Gas
		Oil Equipment, Services & Distribution	Oil Equipment & Services
			Pipelines
TECHNOLOGY	Technology	Software & Computer Services	Computer Services
			Internet
			Software
		Technology Hardware & Equipment	Computer Hardware
			Electronic Office Equipment
			Semiconductors
			Telecommunication Equipment
UTILITIES	Utilities	Electricity	Electricity
			Gas Distribution
		Gas, Water & Multiutilities	Multiutilities
			Water